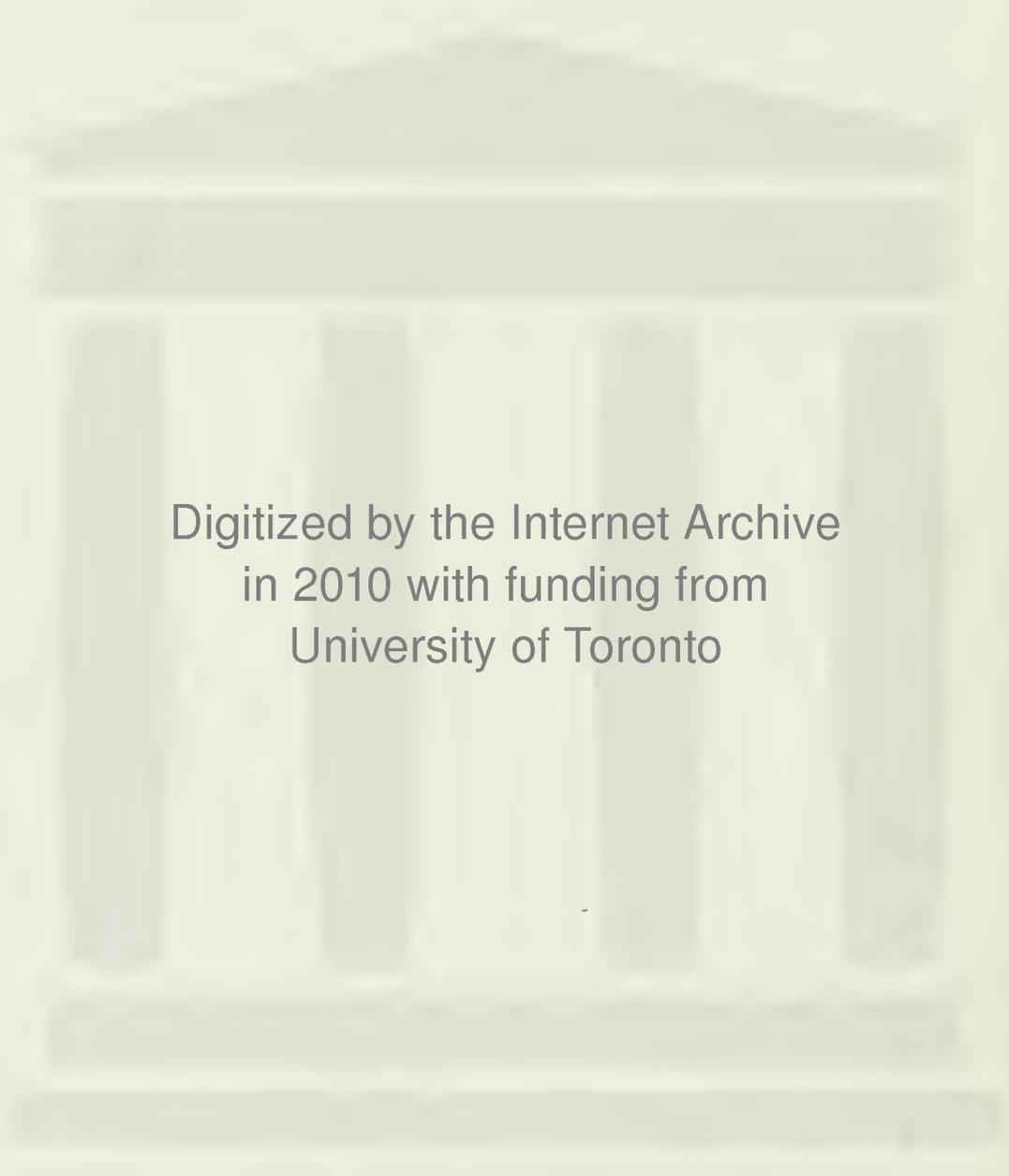




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THE  
**CYCLOPÆDIA;**  
OR,  
**Universal Dictionary**  
OF  
**ARTS, SCIENCES, AND LITERATURE.**

VOL. XXVII.



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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# CYCLOPÆDIA:

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ARTS and SCIENCES.

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### PERTUSSIS.

**P**ERTUSSIS, in *Medicine*, popularly termed the *kink-cough*, *kin-cough*, *chin-cough*, and *hooping* or *whooping-cough*, is a violent convulsive cough, occurring but once during life, and therefore chiefly affecting children, and propagated by a specific contagion.

Different opinions have been entertained respecting the origin of these names, which are of popular invention, for it would appear, that the disease was familiarly known to the vulgar (like many others), before any clear account was given of it by medical writers. The term *whooping-cough*, indeed, is obviously taken from the peculiar sound which is produced during the fit of coughing, in drawing in the breath, and which is commonly called a *whoop*. The term *chin-cough* Dr. Johnson was disposed to derive from the Dutch word *kinckin*, which signifies *to pant*; but this is probably a mistake. The word *kink* is still a provincial term, used in the north, as synonymous with *fit* or *paroxysm*; whence in Scotland they speak of a kink of laughing, a kink of crying, &c. as well as of a kink of coughing. (See Dr. Watt's Treatise on Chin-cough, p. 18.) The term *kink-cough*, therefore, very appropriately expresses a species of cough, which is principally distinguished by its violent *fits* or *paroxysms*. *Kin-cough* and *chin-cough* are apparently the same word; abbreviated; in the former instance, by dropping the final *k*; and softened by the southern dialect, in the latter, in the same manner as *kirk* is softened into *church*.

Among medical writers in Latin, the disease has been designated by a variety of names. Sydenham appears to have given it the appellation of *Pertussis*, which was adopted by Dr. Cullen, and has become the nosological term. By Willis, Hoffmann, and others, it has been called *Tussis convulsiva*, *ferina*, *clausa*, *suffocativa*, *puerilis*, &c., all which epithets refer to some circumstance supposed to be peculiar to the disease. By the French, it is called *la coqueluche*.

This disease usually commences with the ordinary symptoms of a catarrh arising from cold, and commonly retains this character for the space of a fortnight or more. In some instances, indeed, although evidently originating from the contagion of chin-cough, it has never put on any other form than that of a common catarrh. This, however, is a rare occurrence: for, in general, about the end of the second, or beginning of the third week, the symptoms undergo a remarkable change, and the disease exhibits its peculiar and characteristic symptoms, a *convulsive* cough. This is a cough in which the expirations are made with extraordinary rapidity and violence, and so long and frequently repeated, that the whole air seems to be expelled from the lungs, and the patient appears to be in danger of suffocation. At length a full and violent inspiration is necessarily made for his relief, which, from the unusual velocity with which the air rushes in, produces the peculiar sound, or *whoop*, which resembles the crowing of a cock, or the rapid passage of air through a brazen tube. After this sonorous inspiration, the convulsive coughing and expirations are again renewed, and followed by another *whoop*: and thus the alternate actions go on, until a quantity of mucus is thrown up from the lungs, or the contents of the stomach are ejected by vomiting. Either of these evacuations commonly puts an end to the coughing, and the patient remains free from it for some time after. The duration of the paroxysm and the relief obtained are very different in different instances. Frequently expectoration or vomiting takes place after the second coughing, and terminates the fit; but sometimes this happens only after several alternate coughings and whoopings: and in very severe cases, the paroxysm ends in the complete exhaustion of the patient, without any discharge whatever.

The fits of coughing return at various intervals, rarely observing any exact period. They happen several times in

the course of the day, and more frequently in the course of the night. In general they come on without any obvious cause; but they are also brought on sooner and more violently by various sources of irritation, as by considerable bodily exertion, such as running, or even laughing, turning from side to side in bed, distending the stomach by food, or irritating it by such as is indigestible, swallowing food or drink, &c. Fretting and exciting the patient to anger, especially if it produce crying, commonly brings on the fit. Though the paroxysms come on suddenly, the patient has commonly some warning, which excites his alarm; and to avoid the violent and painful concussion which the coughing occasions to the whole body, he sometimes throws himself on the ground, or clings fast to any thing that is near him, or demands to be held fast by any person that he can come at, and will even run across the room for that purpose, with terror and supplication expressed in his countenance. Even when the patient is lying in bed, it seems to give him a sort of relief to have his back and head supported. When the fit is over, if it has been severe, he breathes fast and seems to be fatigued for a short time; but in ordinary cases very little of this appears; and children are commonly so entirely relieved, that they immediately return to their play, as if nothing had happened. If the fit of coughing ends in vomiting up the contents of the stomach, the patient is commonly immediately after seized with an irresistible craving for food, which he swallows greedily.

At the commencement of the disease, there is sometimes very little expectoration, and that of a thin mucus only; and while this continues to be the case, the fits of coughing are more violent, and continue much longer: but commonly the expectoration soon becomes considerable, and a very thick mucus, often in great quantity, is thrown up; and as this is more readily expectorated, the fits of coughing are of shorter duration. If the fits are violent and long continued, they necessarily interrupt the free transmission of the blood through the lungs, and consequently also the free return of blood from the vessels of the head. This gives rise to that turgescence and suffusion of the face, which commonly attend the fit of coughing, and seems to occasion also those eruptions of blood from the nose, and even from the eyes and ears, which sometimes happen in this disease.

Sydenham speaks of the whooping-cough as unconnected with fever; and Dr. Cullen does not seem to have considered fever as an essential part of the disease, since he has not placed it among the *Pyrexia*, in his nosology. Nevertheless, this able observer remarks, "though Sydenham had seldom observed it, we have found the disease very frequently accompanied with pyrexia, sometimes from the very beginning, but more frequently only after the disease had continued for some time. When it does accompany the disease, we have not found it appearing under any regular intermittent form. It is constantly in some degree present; but with evident exacerbations towards evening, continuing till next morning." (First Lines, parag. mcccxc.) Dr. Watt observes, upon this point, "as far as my experience goes, I am disposed to believe, that, even in the mildest cases, as long as the fits (paroxysms) continue, there is always some part of the day when the presence of fever can be detected. It may be so slight as hardly to deserve notice; but still, to an attentive observer, who has opportunities of seeing the patient day and night, it is abundantly obvious. I have remarked it even in those favourable cases, where the appetite continued good, and where the patients seemed to suffer little or nothing in their general health." Treatise on Chin-cough, p. 50.

In almost every case of the disease, the breathing is more or less affected. Frequently there is a difficulty of breathing, not only immediately before and after the fits of coughing, but constantly present. Even in the mildest cases, the patient is sooner out of breath than usual; and in the more severe, he pants on the least exertion, as if he had run a race, or performed some feat of bodily strength.

The course and event of this disease are very uncertain. In the mildest form, in which it appears, it commonly continues from one to three months; and, in the more severe, considerably longer. Even after it has nearly or wholly ceased, an accidental exposure to cold occasions a return of the disease. When it proves fatal in very young children, Dr. Watt affirms, it is generally by inducing suffocation, convulsions, or by bringing on such a state of debility, that the patient seems to expire from pure exhaustion. But, in children somewhat farther advanced in age, the symptoms of pneumonic inflammation, though sometimes of a slow and obscure character, more generally ensue. Dr. Cullen states that he had hardly ever seen an instance of fatal chin-cough, in which a considerable degree of pyrexia and dyspnoea had not been for some time constantly present. In fact, it would appear that the disease commonly proves fatal; in consequence of inflammation supervening in the bronchial cells and tubes, constituting a sort of peripneumonia notha, by which these air-passages are choked up, a copious excretion of mucus taking place, beyond the powers of the constitution to expel. In several instances, in which the state of the lungs was ascertained by dissection after death, the most remarkable phenomena that presented themselves, were, an inflamed condition of the trachea and bronchia, particularly of the latter, and an almost entire plugging up of the bronchial passages with a serous or mucous fluid, interspersed with flakes of a semi-purulent matter. See Watt, on Chin-cough, p. 123.

From these considerations, the following circumstances have been pointed out, as affording the means of prognosticating the favourable or unfavourable event of the disease. The younger the subject, the more dangerous the disorder; so that a large majority of those who die from its attacks are observed to be under two years of age. The converse of this is also true, the older children are, they are the more secure against an unhappy event, provided they be of sound constitution. Children born of phthisical and asthmatic parents, are most liable to suffer from the violence of the disease.

When the disease begins in the form of a severe catarrh, and is attended with difficult breathing, and with little expectoration, it often proves fatal, without assuming the character of whooping-cough; that is to say, the inflammation is so rapid and extensive as to terminate life, before the usual course of whooping-cough is run; but, in the majority of cases, the occurrence of the convulsive cough and whooping, bringing on at the same time a more free expectoration, generally removes the danger.

When the disease is fully formed, if the fits are neither frequent nor violent, the expectoration moderate, and the patient, during the intervals of the fits, is easy, retains his appetite, sleeps well, and is without fever or difficulty of breathing, the disease must be considered as free from danger; and these circumstances becoming daily more favourable, it very soon spontaneously terminates. But an expectoration, either very scanty or very copious, is attended with danger, especially if the latter is accompanied with great difficulty of breathing. The danger of the disease in general, indeed, may be said to be in proportion to the fever and difficulty of breathing attending it, which imply the

## PERTUSSIS.

the degree of inflammatory action going on in the chest; sometimes, though very rarely, the danger arises from the violence of the fits of coughing, which may be such as to occasion apoplexy, epilepsy, or immediate suffocation. When the disease attacks persons under a state of great debility, it has very often an unhappy event.

On the contrary, those cases in which the fits terminate by vomiting, and are immediately followed by a craving for food, are generally without danger. A moderate hæmorrhage from the nose often proves salutary; but very large hæmorrhages are generally very hurtful. Cullen, First Lines, § 1413.

*Treatment of Pertussis.*—The cure of whooping-cough has always been considered as difficult; for in its mildest form, it will run through its course without any interruption or abbreviation from medicine, no antidote to its specific contagion being known; and in its more violent and dangerous shape, its symptoms are not easily mitigated by the active measures, which are generally remedial in violent affections of the chest arising from other causes. From this consideration, however, it will follow, that in those cases in which the symptoms are mild, and the disease appears to proceed without any untoward tendency, very little medical interference is necessary. When the disease has continued a considerable length of time, it seems that in this, as in other contagious maladies, the contagion ceases to act, and that then the complaint is prolonged, after the manner of convulsive diseases in general, by the power of habit alone. From this view of the matter, it will appear that when more violent symptoms demand the application of remedies, the practice must be directed to different purposes according to the period of the disease. In the early stages of the cough, the remedies to be employed must be such as obviate the violent effects of the disorder, and its fatal tendency; but after it has been of some continuance, and the severe and urgent symptoms are absent, the only medicines to be advised, are those which may interrupt its course, and break the habit of recurrence, and thus anticipate its spontaneous cessation.

The most urgent and dangerous symptoms are those which indicate the occurrence of inflammation, whether it be seated in the mucous membrane lining the trachea and air-passages, or in the substance of the lungs, constituting a true peripneumony. In proportion, therefore, as the dyspnoea and fever are severe, and as the patient is strong and plethoric, it becomes necessary to employ *blood-letting*, and even to repeat it according to the urgency of the circumstances. Even in more delicate and younger children, some evacuation may be necessary by means of the lancet, in the commencement of the disease; and local bleeding, by leeches applied to the chest, may be resorted to, where general blood-letting is deemed inadmissible. The difficulty of the transmission of blood through the lungs should be watched, and early attacked by this efficient remedy, or the disease will often baffle all the subsequent efforts that can be made.

The next most important mode of diminishing irritation, and an inflammatory tendency, especially in children, is the exhibition of *purgatives*. Every practitioner must have observed the almost constant derangement of the excretions of the bowels, under any acute disease in children, but more especially under those affecting the lungs, and the relief obtained, even in respect to the original disorder, by regulating the alvine discharges. It is important, therefore, when the disease assumes an inflammatory type, to keep up a constant free state of the bowels from the first, by the repeated use of laxatives, especially of those which contain a portion of calomel. According to the state of actual constipation,

or of mere derangement of the excretions, the purgatives will be used more actively at intervals, or more constantly in smaller doses.

Of all other remedies, *emetics* appear to be among the most useful in this disease. For they not only tend to determine the fluids to the surface, and still more effectually to relieve the lungs by promoting its secretions, but they tend to interrupt the recurrence of the spasmodic affections, and also to relieve the stomach and bowels from their vitiated contents. Perhaps the kind of emetic administered is not of so much importance to be considered, as some writers have contended. The antimonial preparations, and those of ipecacuanha, afford a sufficient number for our choice, and the milder or more active will be chosen, according to the urgency of the case, and the vigour of the patient.

As a secondary expedient, with a view to obviate or remove inflammatory determination to the lungs, when it occurs in this disease, the application of *blisters* is often beneficially resorted to; and it may be advisable to repeat the application several times, where the inflammatory tendency continues to prevail, after the more active measures have been carried to the extent which circumstances admit of, or where the debility of the patient interdicts blood-letting altogether. The blisters should be applied to the chest, and not to distant parts. They do not, however, appear to act so beneficially in the relief of the pain and dyspnoea attending this disease, as in ordinary cases of catarrhal cough; and ought not to be relied on, where the inflammatory congestion in the lungs is considerable. They are most beneficial, when this inflammatory condition has been already partly subdued by the more active evacuations. *Issues* have been recommended by some practitioners; but their operation must be too slow to be depended upon in the acute stages of the disease; and they can only be indicated, therefore, where the disease has ultimately assumed a chronic form, or some phthical symptoms have supervened, with considerable local pain.

These methods of treatment, together with the exhibition of light diaphoretic medicines, and the use of a cooling diet, are adapted to the early stages of whooping-cough, where the usual urgent symptoms occur, and are calculated to obviate its fatal tendency, and to put it into a safe train. But in the after-stages, when the operation of the contagion may be supposed to have ceased, and the convulsive cough to be continued through the influence of habit, a different indication arises, and different remedies are to be employed. That the power of habit contributes to keep up the disease, after the influence of the contagion has declined, is to be inferred from these circumstances, *viz.* that the symptoms have disappeared, like other nervous symptoms, in consequence of the impression of terror, or other strong emotions of the mind; that any considerable change in the state of the system, such as the occurrence of small-pox, has also cured it; and that it has yielded to antispasmodic and tonic medicines: none of which agents can be supposed to have the power either of correcting or expelling a morbid matter from the constitution, but which are evidently suited to change the state and habits of the nervous system. It might perhaps, indeed, be alleged, that when the contagion is extinguished, it implies that the violence and danger of the disease are over, and consequently that the disease will soon spontaneously cease. This supposition, however, is contradicted by experience; as the disease, like many other convulsive and spasmodic affections, may continue for a long time by the power of habit alone, and the repetition of the paroxysms may be productive of hurtful effects, and more especially as their violence and injurious influence may be much aggravated

vated by various external causes, that may be accidentally applied.

The indication, therefore, of breaking the habit of recurrence is proper to be attended to; and it is principally to be fulfilled by those means which lessen irritability local or general, and give tone to the system at large; in other words, by *antispasmodics* and *tonics*.

The most effectual means of allaying irritability are found in the *narcotic antispasmodics*, such as *opium*, *henbane*, and *hemlock*, in their various preparations; and the most powerful of these is opium. This medicine requires considerable caution, however, in its administration. "If very liberally employed," to use the words of Dr. Watt, "it suppresses the cough, allows the mucus to accumulate, obstructs the breathing, increases the fever, and in fact aggravates every symptom of the disease. This is still more particularly the case, if previous evacuations have been neglected. Where the bowels are already in a loaded and torpid state, opiates invariably do harm. Some practitioners have supposed, that they may be given in such small doses as to compose the nervous system, and yet not interfere with the operation of other remedies. If this can be done, the practice is less objectionable." It is only in small doses that opiates can be administered, even in the later stages of whooping-cough, on account of this astringing and suppressing power over the discharges. On this account, perhaps, the *conium* or *hyoscyamus* are preferable remedies. They are more gently anodyne, and have no astringency, and therefore interfere little with the secretion of mucus, and perhaps not at all with the alvine secretions. The *conium*, or hemlock, has been extolled by Dr. Butter as almost a specific in this disease; and from our own experience, we can speak favourably of its influence, when the inflammatory stage of the disorder is past. The *hyoscyamus* is likewise beneficial under the same circumstances. The *digitalis*, or fox-glove, from its power in moderating vascular action, and thus of restraining excessive secretion, as well as of acting upon the urinary discharge, might be expected to be serviceable in this disease; and experience seems to have proved its utility.

The more stimulant antispasmodics, such as *assafœtida*, *castor*, *musk*, *oil of amber*, *camphor*, &c. have also been recommended by several practitioners for the relief of whooping-cough. The evidence, however, which the subsequent observation of cautious physicians has obtained, is by no means favourable to the efficacy of these medicines; and if there is any tendency to fever, or congestion about the lungs, the influence which they do exert must prove hazardous, if not always injurious.

But these stimulants have been frequently applied *externally*, since the time of Hoffmann, in liniments and embrocations; and they are popularly employed, in various empirical nostrums, in the same manner. The oils of turpentine, amber, thyme, nutmeg, &c. with soap, camphor, the compound spirit of ammonia, tincture of opium, of cantharides, &c. the juice of garlic, liniments of tartrate of antimony, and various other irritants, have been employed, separately and combined, being rubbed into the chest, and on the back in the course of the spine, and even on the feet, by continued but moderate friction. This mode of using antispasmodics is certainly productive of beneficial effects; and these may be produced in two ways, namely, by the actual absorption of the substance so applied to the skin, or by the mere stimulation of the surface, which thus occasions a sort of counter-irritation. Opiate liniments unquestionably operate in the former manner, and produce similar effects, though in a smaller degree, with opiates taken by the mouth. They relieve the difficulty of breathing, and diminish the cough,

and dispose the patient to rest, and therefore have been deemed by some writers the safest form in which opium can be employed. It is probably, however, in the second mode only that the majority of embrocations and liniments operate; and accordingly it will generally be found, that they are productive of the greatest relief, when they excite some degree of redness or eruption on the skin.

The administration of tonics, and especially of the *Peruvian bark*, has been much extolled by Dr. Cullen, as the most effectual mode of curing the disease in its second stage, when the fever had disappeared. This remedy may doubtless be resorted to with advantage, towards the conclusion of the disease, when all the inflammatory symptoms have been previously subdued by other means, or where they have been naturally very mild, and have spontaneously subsided. But in other circumstances, the bark is not only a doubtful, but a dangerous remedy.

It was perhaps originally with the view of interrupting the force of habit, that a considerable change in the situation and manner of life was suggested as a remedy for whooping-cough, and especially a *change of air*, which has been very generally deemed the most effectual remedy in the advanced stages of the disease. So strong, indeed, has this impression been made upon the public, that it has been generally believed, that any change of air, even from a better to a worse, is beneficial. This, however, seems improbable; and the fact perhaps is as Dr. Watt has stated it. "It no doubt frequently happens," says that intelligent writer, "that a child is better on being taken from one place to another, even when the air in the latter place is supposed to be worse than the former. Here, however, I should be disposed to attribute the good effects, not to coming into a more impure atmosphere, but to the child's *being abroad*, any atmosphere being better than confinement to the house." (Loc. cit. p. 222.) In summer, or when the temperature is mild and dry, the symptoms of whooping-cough, even in the early stage, appear to be alleviated by exposure to the open air, and to be aggravated when the patient returns into the house: but this alleviation only takes place, when it is unaccompanied by actual pneumonic inflammation, when the pulse is neither strong, nor full, nor frequent, when the cough is not very violent, when there is no pain of the chest, and, above all, when there is no oppression of the breathing. Under the presence of these symptoms, such exposure is extremely deleterious. Towards the conclusion of the disease, travelling, or other constant exercise in the open air, as in other cases of convalescence from coughs, is doubtless one of the most effectual remedies that can be resorted to.

PERU, in *Geography*, a viceroyalty of South America, the limits of which have been greatly restricted during the course of the last century; for in the year 1718 the provinces of Quito in the north, as far as the river Tumbez, were annexed to the viceroyalty of New Granada; and in 1778, several opulent provinces in the south of Peru were annexed to the new viceroyalty of La Plata. Modern Peru, therefore, according to the statement of Mr. Pinkerton, extends N. and S. from the river Tumbez to the chain of Vilcanota, being, by the computation of Estalla, 289 geographical leagues; but along the coast to the river Loa, the length may be 423 leagues; its medial breadth may be about 80 leagues; so that its whole content may be estimated at 33,636 square leagues. By the map of La Cruz, the southern extremity of the chain of Vilcanota is  $15^{\circ}$ , and the river Tumbez in  $3^{\circ} 30'$ , both S. lat.; and the difference, being  $11^{\circ} 30'$ , will give 690 geographical miles; but that long strip, called the province of Arica, extending to the river Loa  $21^{\circ} 15'$ , the nominal length will be augmented

## PERU.

by about 6° 15', or 375 geographical miles. The viceroyalty of Peru borders, towards the N., on that New Granada; on the N.E. with the Pampa del Sacramento; on the E. with the savage nations of the Pajonal, which is a vast steppe, covered with stony grass, whence its name; and on the S.E. with the viceroyalty of Buenos Ayres, which embraces the province and desert of Atacama, formerly the boundary between Peru and Chili. But if it extends eastwards so as to include Colonna, or the field of the Missions, which depend on the viceroy, it will thus reach to the Portuguese frontier.

Before we farther describe this viceroyalty geographically, we shall introduce a brief account of its history. The first intelligence which any European received concerning this country, was communicated to Vasco Nugnez de Balboa, governor of a small Spanish colony at Santa Maria, in Darien, in the year 1512; and he flattering himself with sanguine ideas of the wealth it would afford from the vague description that was given of it, prepared to make a voyage in search of it. But being superseded in the government of Darien by Pedrarias Davila, who was appointed by Ferdinand of Spain to succeed him, he was disappointed in the accomplishment of the schemes which he had projected; and it was reserved for Francisco Pizarro to obtain the patronage of Pedrarias, and to set sail, with some chosen associates, on this adventurous expedition. After encountering various difficulties, they at length, in the year 1526, discovered the coast of Peru, and landed at Tumbez, about 3° S. of the line; a place of some note, distinguished for its stately temple and a palace of the Incas or sovereigns of the country. Pizarro, however, was under the necessity of satisfying himself with a general view of the opulence and civilization of the country; as the force, which he commanded, was not equal to any attempt that would be likely to succeed for gaining possession of it. Having explored the country along the coast, maintaining a peaceable intercourse with the natives, he took with him some specimens of the productiveness of the territory and opulence of the inhabitants, and returned to Panama towards the close of the third year of his departure from it. The governor discouraged his scheme of conquest, but the three associates, Pizarro, Almagro, and Luque, determined to persevere; and Pizarro went to Spain, in order to procure the force that was necessary for their purpose. Here he disregarded his associates, and secured the sole command to himself, as well as the appointment of governor, captain-general, and adelantado of the whole country, which he had discovered and hoped to conquer. With a supply of men, money, and military stores, apparently very inadequate to the necessary demands of his proposed expedition, and accompanied by his three brothers Ferdinand, Juan, and Gonzalo, and his mother's brother Francisco de Alcantara, he returned to Panama. Pizarro, with an armament consisting of three small vessels, and 180 soldiers, set sail in February, 1531, for Peru, in order to invade that great empire, and after a voyage of thirteen days landed his troops in the bay of St. Matthew, 100 leagues N. of Tumbez, the place of his destination. The imprudence of Pizarro in attacking the natives, soon after landing on their coast, the apparent infertility, unhealthfulness and scanty population of the adjoining country, and the difficulties that occurred in their march, discouraged his companions; and struggling with famine, fatigue, and various kinds of diseases, they began to complain and to reproach their leader: but in the month of April they arrived in the province of Coaque, and having surprized a principal settlement of the natives, they seized vessels and ornaments of gold and silver,

amounting, in value, to 30,000 pesos, besides other booty, which dispelled their doubts, and inspired the most desponding with sanguine hopes. Having taken measures for obtaining a reinforcement from Panama and Nicaragua, he continued his march along the coast, and met with hardly any resistance, until he attacked the island of Puna in the bay of Guayaquil. From Puna, which he had not been able to reduce to subjection in less than six months, he proceeded to Tumbez, where, on account of the distemper which raged among his troops, he was obliged to remain for three months. From Tumbez he advanced, in May 1532, to the river Piura, and in an advantageous situation near its mouth, he established the first Spanish colony in Peru, to which he gave the name of St. Michael.

At the time when the Spaniards invaded Peru, the dominions of its sovereigns extended in length, from N. to S., above 1500 miles along the Pacific ocean: and their breadth, from E. to W., was much less considerable, being uniformly bounded by the vast ridge of the Andes, stretching from one of its extremities to the other. Peru, like other parts of the new world, was originally possessed by small independent tribes, differing from each other both in manners and policy. It is generally said, that they were savage and uncivilized, and that they roamed about naked in the forests, with which the country was covered, more like wild beasts than like men. Whilst they were struggling with the hardships and calamities of this barbarous state, tradition reports, that there appeared on the banks of the lake Titiacaca, a man and woman of majestic form, and clothed in decent garments, who declared themselves to be children of the sun, sent by their beneficent parent to instruct and to reclaim them. At their persuasion, it is said, several of the dispersed savages united together, and receiving their commands as heavenly instructions, followed them to Cuzco, where they settled and began to lay the foundation of a city.

From what country the ancient Peruvians originated has been matter of considerable dispute; but while the Mexicans bore many marks of innate African cruelty, the Peruvians display the mildness of an Asiatic tribe. The monarchs, however, and the ruling people, seem to have been very distinct from the general population.

The names of the extraordinary personages above mentioned were Manco Capac, and Mama Ocello (or Oello.) Manco was the first Inca, and he is supposed to have reigned in the 12th or 13th century. Oello was his wife. Having collected some wandering tribes, Manco instructed the men in agriculture, and other useful arts; and Oello taught the women to spin and weave. After securing the objects of first necessity in an infant state, Manco turned his attention towards introducing such laws and policy as might perpetuate their happiness. In consequence of these laws and institutions which served to reclaim and civilize a savage race, he received from his people the title of "Capac," or rich in virtue. Manco Capac founded the temple of the sun at Cuzco, the capital of his empire, and appointed virgins of the royal blood to serve that divinity. Thus, according to the Indian tradition, was founded the empire of the Incas or lords of Peru. At first, its extent was small. The territory of Manco Capac did not reach above eight leagues from Cuzco, within which narrow precincts he exercised absolute and uncontrolled authority. The Incas, his successors, arrogated a similar authority over their subjects, and the despotism of Asia was not more complete. The Incas were not only obeyed as monarchs, but revered as divinities. Their blood was held to be sacred, and, by prohibiting intermarriages with the people, was never contaminated.

raminated by mixing with that of any other race. The family was distinguished by dress and ornaments, which it was unlawful for others to assume. The monarch himself appeared with ensigns of royalty reserved for himself alone: and received from his subjects marks of obsequious homage and respect, which approached almost to adoration. But, among the Peruvians, this unbounded power of their monarchs seems to have been uniformly accompanied with attention to the good of their subjects. It was not the rage of conquest, as it has been said, that prompted the Incas to extend their dominions, but the desire of diffusing the blessings of civilization, and the knowledge of the arts which they possessed, among the barbarous people whom they reduced. Of these Incas, Dr. Robertson says, there was a succession of twelve, and it is said, that not one deviated from this beneficent character. Alcedo, in his account of Peru, cited by Mr. Pinkerton, reckons seventeen of these Incas. The 2d was Sinchi Roca, or Roca the brave, son of the former, who extended his dominions about 60 miles to the S. of Cuzco: the 3d was Lloque-Yupanqui, who subjected many tribes, and extended his kingdom, or empire, in many directions: the 4th was Maita Capac, son of the former, who also subdued several districts, and erected some edifices: the 5th, Capac Yupanqui, was another conqueror: the 6th, Inca-Roca, subdued several little districts and tribes: the 7th was named Yabuar-Huacac: the 8th, Inca-Ripac, with an army of 30,000 men, conquered many provinces; and the chief of Tucma, or Tucuman, is said to have paid homage at Cuzco: the 9th, Inca Urco, was deposed after 11 days: the 10th, Pachacutec, subdued Jauja, Tarma, and other provinces: the 11th, Yupanqui the third, carried his conquests to the river Mauli in Chili, and over the Majos, far to the E. of the Andes, about the year 1450: the 12th, Tupac Yupanqui, was also a conqueror: the 13th, Huayna Capac, subdued, as far as Tumbez, the kingdom of Quito, which he left to Atahualpa; and his own sceptre to his eldest son: the 14th, Inti-Cusi-Hualpa, who fought a bloody battle with his brother in the vicinity of Cuzco, but lost the day, and was made prisoner: the 15th, Atahualpa, the usurper, reigned at the time when Pizarro landed at Tumbez, and was made prisoner in a battle with that conqueror near Caxamalca, (Caxamarca,) and was beheaded in prison, thus suffering a punishment which he had inflicted on his brother and legal sovereign: the 16th, Manco Capac, was crowned, with permission of Pizarro, at Cuzco, and being afterwards defeated by the Spaniards, retired to the mountains, and is thought to have died about 1553: the 17th, and last of the Incas, or emperors of Peru Sayri Tupac, resigned the sovereignty to Philip II. of Spain, and died a Christian, leaving only one daughter, who married Onez de Loyola, a Spanish knight, from whom descend the marquises of Onepesa and Alcanifes. If we reckon 15 reigns to 1532, at 20 years each, we shall have 300 years for the duration of the monarchy. The monarchy of the Incas, extending from the river Tumbez  $3^{\circ} 30'$ , (without mentioning the subjection of Quito) to the river Mauli in Chili,  $35^{\circ}$ , that is,  $31^{\circ} 30'$ , or nearly 1900 geographical miles, may well deserve the name of an empire; while the Mexican princes only ruled a country of about one-third of the extent, and which might be honoured by the title of a kingdom. We need not, therefore, be surpris'd by the comparative magnificence of the Peruvian monarchs.

When the Spaniards first visited the coast of Peru, in 1526, Huayna Capac, the 12th (or by the last enumeration, the 13th) monarch from the founder of the state, was seated on the throne. He died about the year 1529, and appointed

his son Ahualpa, his successor in the kingdom of Quito, and the rest of his dominions to Huascar (Inti-Cusi-Hualpa), his eldest son, by a mother of the royal race. The arrangement of Huayna Capac excited general disgust, and terminated in a contest between the two brothers. When Pizarro landed in the bay of St. Matthew, this civil war was in its greatest fury, and contributed in no small degree to the success of his plan of conquest. Without detailing all the previous measures which he adopted, and extending the article far beyond our prescribed limits, we shall merely observe, that he left St. Michael with a force, consisting of 62 horsemen, and 102 foot soldiers, of whom 20 were armed with cross-bows and three with muskets, and pursued his course to Caxamalca, a small town at the distance of twelve days' march from St. Michael, where Ahualpa was encamped with a considerable body of troops. Prejudging that his views were pacific, and that he meant merely to assist the Inca against those enemies who disputed his title to the throne, the Inca gave him a friendly reception. On his arrival at Caxamalca, Pizarro took possession of a large court, on one side of which was a house, called by the Spanish historians a palace of the Inca, and on the other a temple of the sun; the whole being surrounded with a strong rampart, or wall of earth.

Ahualpa, relying on the perfidious professions of Pizarro, left his camp, about a league distant from the town, and, in compliance with the invitation of the invader, determined to pay him a visit. As the Inca drew near the Spanish quarters, father Vincent Valverde, chaplain to the expedition, advanced, with a crucifix in one hand, and a sword in the other; and having stated to him a variety of theological doctrines, intermixed with the claims of St. Peter and the popes, and with an account of the donation made to the king of Castile, by pope Alexander, of all the regions in the new world, he required Ahualpa to embrace the Christian faith, to acknowledge the supreme jurisdiction of the pope, and to submit to the king of Castile as his lawful sovereign; promising, on this condition, that the Castilian monarch would protect his dominions, and permit him to continue in the exercise of his royal authority; and at the same time denouncing war and vengeance in his master's name, if he impiously refused to obey this summons. Ahualpa's reply to this strange harangue, a great part of which he could not be supposed to understand, was temperate: after observing, that he was lord of the dominions over which he reigned by hereditary succession, and that he could not conceive how a foreign priest should pretend to dispose of territories which did not belong to him; and that if such a preposterous grant had been made, he, who was the rightful possessor, refused to confirm it: he declared that he had no inclination to renounce the religious institutions established by his ancestors, and that he would not forsake the service of the sun, the immortal divinity whom he and his people adored, in order to worship the gods of the Spaniards, who were subject to death; but with respect to other matter, new to him and unintelligible, he wished to be informed where the priest had learned things so extraordinary. Valverde replied, "in this book," holding out to him his breviary. The Inca eagerly opened it, and turning over the leaves, lifted it to his ear: "This," says he, "is silent: it tells me nothing:" and threw it with disdain upon the ground. The enraged monk, running towards his countrymen, exclaimed "To arms, Christians, to arms: the word of God is insulted; avenge this profanation on these impious dogs." Pizarro, instantly throwing off the mask, gave the signal of assault, which was immediately commenced with great fury: and Pizarro himself advancing, at the head of his whole band,

band, towards the Inca, seized him by the arm, dragged him to the ground, and carried him to his quarters as a prisoner. The fate of the monarch increased the precipitate flight of his followers, who were pursued by the assailants, and slaughtered, though the wretched fugitives did not once offer to resist. The carnage did not cease till the close of the day; and, by taking a medium of different accounts, 4000 Peruvians were killed. Pizarro himself was wounded, but not a single Spaniard fell. The plunder of the field was immense; and the march of the Spaniards was followed by the most extravagant exultation. The Inca made a most liberal offer of a ransom. The apartment in which he was confined was 22 feet in length, and 16 in breadth; nevertheless, the captive monarch undertook to fill it with vessels of gold as high as he could reach. Pizarro closed eagerly with this tempting proposal; and a line was drawn upon the walls of the chamber, to mark the stipulated height to which the treasure was to rise. Ahatualpa, transported with the prospect of regaining his liberty, dispatched messengers to Cuzco, Quito, and other places, to collect the gold that was necessary for completing his ransom. In the mean while, the Spaniards remained tranquil and unmolested in Caxamalca. At this time Almagro arrived with a considerable reinforcement, which was highly acceptable and encouraging to the Spaniards, and no less alarming to the Inca. Perceiving his own destruction to be inevitable, and apprized that his brother Huascar had promised to the Spaniards, on condition of their espousing his cause, a quantity of treasure very much exceeding what Ahatualpa had engaged to pay for his ransom, determined to sacrifice his brother's life, that he might save his own; and his orders for this purpose were immediately executed. The treasures promised by Ahatualpa being collected, and some pieces of curious fabric being reserved as a present for the emperor, the dividers of the spoil set apart a fifth part for the crown, and 100,000 pesos as a donation to the soldiers who had arrived with Almagro, and there remained 1,528,500 pesos to Pizarro and his followers. In this division, above 8000 pesos, at that time not inferior in effective value to as many pounds sterling in the last century; fell to the share of each horseman, and half that sum to each foot soldier. Pizarro himself, and his officers, received dividends proportioned to the dignity of their rank. Although the Inca's ransom was paid, Pizarro had no thoughts of fulfilling his promise by granting liberty to the captive sovereign. While Almagro and his followers, who had made a demand of an equal share in the Inca's ransom, insisted eagerly on putting him to death, that all the adventurers in Peru might afterwards be on an equal footing, Pizarro himself either actually felt or feigned some apprehensions on account of the forces that were assembled in the remote provinces of the empire. Ahatualpa also inadvertently contributed to hasten his own fate, by expressing his contempt of Pizarro, as a person of mean attainments. All these circumstances concurred to bring him to a kind of mock-trial; Pizarro, Almagro, and two assistants being appointed judges, with full power to acquit or condemn. The result was what might have been expected, the condemnation of Ahatualpa to be burnt alive; but Valverde, availing himself of the fears of the Inca, prevailed upon him to be baptized, in token of his having embraced the Christian faith; and thus, instead of being burnt, he was strangled at the stake. On the death of Ahatualpa, the government was dissolved, and Pizarro invested one of his sons with the ensigns of royalty; hoping to take advantage of the inexperience of youth, rather than to entrust power in the hands of an ambitious monarch, who had been accustomed to independent command. This happened in the year 1533. Pizarro

hastened his march to Cuzco, and took quiet possession of that capital. During this march, that son of Ahatualpa, whom Pizarro treated as Inca, died; and as the Spaniards substituted no person in his place, the title of Manco Capac, a brother of Huascar, whom the people of Cuzco and the adjacent country acknowledged as Inca, seems to have been universally recognized. In the mean time Benalcazar, governor of St. Michael, marched to Quito, and reduced it. Whilst these operations were carried on, Ferdinand Pizarro arrived in Spain; and by the immense quantities of gold and silver which he carried with him, secured a very favourable reception; and in recompence of his brother's services, his authority was confirmed with new powers and privileges, and the addition of 70 leagues, along the coast, to the southward of the territory, granted in his former patent. On Almagro was conferred the title of Adelantado, or governor, with jurisdiction over 200 leagues of country, stretching beyond the southern limits of the province allotted to Pizarro. Ferdinand himself was admitted into the military order of St. Jago, and soon set out on his return to Peru, accompanied by many persons of higher rank than any of those who had yet served in that country.

In the year 1534, Pizarro, after settling some differences between him and Almagro, began to introduce a form of regular government into the extensive provinces subject to his authority. He distributed the country into various districts; he appointed proper magistrates to preside in court; and established regulations concerning the administration of justice, the collection of the royal revenue, the working of the mines, and the treatment of the Indians, extremely simple, but well calculated to promote the public prosperity. In his march through the country, he was struck with the beauty and fertility of the valley of Rimac, one of the most extensive and best cultivated vallies in Peru. There, on the side of a small river of the same name with the vale which it watered and encircled, at the distance of six miles from Callao, the most commodious harbour in the Pacific ocean, he founded a city, which he destined to be the capital of his government, and gave it the name of Ciudad de los Reyes; but it is now better known by the appellation of Lima.

In 1536, an insurrection took place in Peru, which was excited and encouraged by the Inca, Manco Capac; who recovered possession of one-half of Cuzco, though it was vigorously defended by the three brothers Juan, Gonzalo, and Ferdinand Pizarro. On this occasion Juan was killed. But the interest and power of the Pizarros were still more endangered by Almagro; who was at length, in 1538, defeated and taken prisoner, and soon after impeached of treason, formally tried, and condemned to die. The sentence was executed by first strangling him in prison, and afterwards publicly beheading him. In 1540 Pizarro divided Peru among his followers; but in the following year the adherents of Almagro conspired against his life, and without much delay put him to death. Pizarro was succeeded in the government by Vaca de Castro. During these convulsions in Peru the emperor and his ministers were employed in preparing regulations for restoring tranquillity there, and introducing a more perfect system of internal policy into all their settlements in the new world. Blasco Nunez Vela was appointed governor of Peru, with the title of viceroy. His conduct after his arrival increased the disaffection and tumult which had begun to take place; and the malcontents made choice of Gonzalo Pizarro for their leader, which happened in 1544, and occasioned a civil war. After a decisive victory gained by Pizarro in a battle, which terminated his life, Pizarro was advised to assume the sovereignty of Peru; but he chose to negotiate with the court of Spain.

In the mean while the Spanish government were preparing to send over as president Pedro de la Gasca, a priest of no higher station than counsellor of the inquisition. Upon his arrival in Peru, in the year 1548, he first made every effort in his power towards an accommodation with Pizarro; but his attempts of a pacific nature were ineffectual: and both parties prepared for battle. Pizarro, whose government had been unpopular, was deserted by his followers, and he surrendered himself to one of Gasca's officers; and was beheaded on the day after he surrendered. In the year 1550, Gasca having accomplished every object of his mission, and wishing to return again to a private station, committed the government of Peru to the court of audience, and set out for Spain, where he was received with an universal admiration both of his abilities and his virtue. The tranquillity of Peru was not of long continuance after his departure. Several successive insurrections desolated the country for some years. However, the commotions that occurred subsided; and men less enterprising, less desperate, and more accustomed to move in the paths of sober and peaceable industry than the first invaders, settled in Peru; and the royal authority was gradually established as firmly there as in the other Spanish colonies.

The most singular and striking circumstance in the ancient Peruvian government, says Dr. Robertson, is the influence of religion upon its genius and laws. The whole system of civil policy was founded upon religion. The Inca appeared not only as a legislator, but as the messenger of heaven. Hence it followed, that his authority was, in the most extensive sense, unlimited and absolute; and to this circumstance it was also owing, that all crimes were punished capitally, because they were not considered as transgressions of human laws, but as insults offered to the Deity. It is observed, that the superstition on which the Incas engrafted their pretensions to the high authority which they assumed and exercised, was of a very different genius from that established among the Mexicans. By directing their veneration to that glorious luminary, which, by its universal and vivifying energy, is the best emblem of divine beneficence, the rites and observances which they deemed acceptable to him were innocent and humane. They offered to the sun a part of the productions which his genial warmth had called forth from the bosom of the earth and reared to maturity: they sacrificed as an oblation of gratitude some of the animals who were indebted to his influence for nourishment; and they presented to him choice specimens of those works of ingenuity which his light had guided the hand of man in forming; but the Incas never stained his altars with human blood, nor could they conceive that their beneficent father, the sun, would be delighted with such victims. Accordingly, the Peruvians, unacquainted with those barbarous rites which extinguish sensibility, or suppress the feelings of nature at human sufferings, were formed, by the spirit of the superstition which they had adopted, to a national character more gentle than that of any people of America. The influence of this superstition operated favourably on their civil institutions, correcting whatever was adverse to gentleness of character, and also on their military system, so that the wars in which the Incas engaged were carried on with a spirit very different from that of other American nations.

It is further observed, that the state of property in Peru was no less singular than that of religion, and contributed towards giving a mild character to the people. All the lands capable of cultivation were distributed into three shares; one share was consecrated to the sun, and its product was applied to the support of religious rites; the second belonged

to the Incas, and was devoted to the support of government; and the third, being the largest share, was reserved for the maintenance of the people. No person had a right of exclusive property in the portion allotted to him; he possessed it only for a year, at the expiration of which a new distribution was made, according to the rank, number, and exigencies of each family. All these lands were cultivated by the joint industry of the community; and the people were summoned by a proper officer to the fields, and performed their common task, while songs and musical instruments cheered them to their labour. In consequence of this mode of distribution selfish principles were restrained and extinguished, and each individual felt his connection with those around him; and the state thus constituted might be considered as one great family, in which the union of the members was so complete, and the exchange of good offices so perceptible, as to create stronger attachment than subsisted under any form of society established in America. From this resulted gentle manners, and mild virtues unknown in the savage state, and with which the Mexicans were little acquainted. Notwithstanding the bonds of affection which the institutions of the Incas served to strengthen among their subjects, there subsisted among them a great inequality of condition; and the distinction of ranks was fully established.

Such a form of society, from the union of its members, as well as from the distinction in their ranks, was favourable to progress in the arts; and the Peruvians had, in fact, advanced far beyond the Mexicans, both in the necessary arts of life, and in such as have some title to the name of elegant. In Peru, agriculture was more extensive and improved than in any part of America. The defects peculiar to their climate and soil served to call forth the exertions of the people. In order to render that part of the country which was sandy and barren, and which was never refreshed with rain, fertile and productive, the Peruvians conducted water from the torrents that poured across their country by means of canals to the fields that wanted a regular supply of moisture; they also enriched the soil by manure obtained from the dung of sea-fowls, that were numerous on the islands, which lay scattered along their coasts; and though the use of the plough was unknown, they turned up the earth with a kind of mattock of hard wood.

In the construction of their houses and buildings also the Peruvians manifested their superior ingenuity; but it was in the temples of the sun, and in the buildings destined for their monarchs, that they displayed the utmost extent of their art and contrivance. The temple of Pachacamac, together with a palace of the Inca, and fortresses, were so connected together, as to form one great structure, above half a league in circuit. Though they had not discovered the use of mortar or of any other cement in building, the bricks or stones are joined with so much nicety, that the seams can hardly be discerned. Notwithstanding the inconvenient arrangement of the apartments, and the want of windows, the architectural works of the Peruvians, which still remain, must be considered as stupendous efforts of a people unacquainted with the use of iron, and with the mode of applying the mechanical powers. The voyage of Ulloa, referred to by Dr. Robertson and other late writers, may be consulted for other remains. Among the ancient edifices of Peru we might mention the obelisks and statues of Tiahuanacu, and the mausolea of Chachapoyas, which are conical buildings of stone supporting large rude busts, probably resembling those of Easter island.

Their public roads are also entitled to high praise; particularly those two great roads from Cuzco to Quito, extending

tending without interruption above 500 leagues; the one through the interior and mountainous country, and the other through the plains on the sea-coast. These works of the Incas might be compared even to the famous military ways, which remain as monuments of the Roman skill and power. The formation of these roads introduced another improvement, which was that of bridges, equally unknown over all the rest of America. See BRIDGE, BALZA, and BOAT.

The Peruvians had also made considerable progress in arts, that may be called elegant. As they possessed metals in greater abundance than any people of America, they manifested great skill and contrivance in procuring them, and in applying them to purposes of use and ornament. Accordingly in works of mere curiosity, and of an ornamental nature, their ingenuity has been highly celebrated. Many specimens of these have been dug out of the "Guacas," or mounds of earth, with which the Peruvians covered the bodies of the dead. Among these are mirrors of various dimensions, of hard shining stones highly polished; vessels of earthen ware of different forms; hatchets, and other instruments, some destined for war, and others for labour. Some were of flint, some of copper, hardened by an unknown process to such a degree as to supply the place of iron on several occasions. But notwithstanding a variety of circumstances, some of which have been enumerated, and which seem to indicate a high degree of improvement in Peru, others occur that suggest the idea of a society still in the first stages of its transition from barbarism to civilization. The Peruvians had no cities besides Cuzco. Every where else, the people lived mostly in detached habitations, dispersed over the country, or, at the utmost, settled together in small villages. In consequence of this state of limited association and imperfect union, they had no perfect separation of professions, which was less complete than that which subsisted among the Mexicans. From the want of cities in Peru, there was little commercial intercourse among the inhabitants of this great empire. But the most remarkable, as well as most fatal defect in their character, was their unwarlike spirit. By reason of this character, their country was subdued at once, and almost without resistance, and remained in a state of subjection; and the same character, connected with mildness of temper and manners, has descended to posterity: so that the Indians of Peru are now more tame and depressed than any people of America. Their feeble spirits, relaxed in lifeless inaction, seem hardly capable of any bold or manly exertion.

Spanish writers have recorded some facts, which manifest, notwithstanding all their good qualities, a great degree of remaining barbarism in their manners. On the death of the Incas, and of other eminent persons, a considerable number of their attendants was put to death, and interred around their Guacas, that they might appear in the next world with their former dignity, and be served with the same respect. On the death of Huana Capac, the most powerful of their monarchs, above 1000 victims were doomed to accompany him to the tomb. In one particular, their manners appear to have been more barbarous than those of most rude tribes. Although they were acquainted with the use of fire in preparing maize, and other vegetables for food, they devoured both fish and flesh perfectly raw, and astonished the Spaniards by a practice repugnant to the ideas of all civilized people. For other particulars we refer to the third volume of Dr. Robertson's "History of America."

The account which is given of the disposition, character, and condition of the Peruvian Indians, in the "Mercurio Peruano," a periodical paper published at Lima in 1791,

and the following years, differs in many particulars from that of Dr. Robertson, and also of Kotzebue and Marmontel. They are said to be of very limited capacities, and of little or no variety in their characters; melancholy from temperament; timid and dispirited from oppression; dastardly in moments of danger; savage and cruel after victory; and severe and inexorable in the exercise of authority. They stand greatly in awe of the Spaniards, and are docile and obedient to their commands; but they secretly dislike them, and shun their society, and only hate them less than they do the negroes and mulattoes. They are of distrustful tempers, and suspect every one who does them a kindness, of a design to impose upon them. They are stout and robust, and capable of enduring labour; but lazy, dirty, and improvident. Their habitations are miserable hovels, destitute of every convenience or accommodation, and disgustingly filthy. Their dress is poor and mean, and their food coarse and scanty. Their strongest propensity is to spirituous liquors; and to this indulgence they sacrifice every other consideration. Their religion is still tainted with the superstition of their forefathers; but they are great observers of the external rites and ceremonies of the church, and they spend large sums of money in masses and processions; a species of profusion to which they are naturally excited and encouraged by their priests, who profit by it.

We shall here add some particulars from the work referred to, concerning the present condition of these people; first premising that soon after the conquest of America, that country was parcelled out into *encomiendas*, a sort of feudal benefices, which were distributed on certain conditions to the Spaniards. The *encomendero*, or holder of the benefice, besides owing military service to the state, was bound to reside on his *encomienda*, to protect and defend the Indians living upon it, and to see them properly instructed in the principles of religion. The Indians were bound in return to pay him a stipulated tribute; but so far were they from being reduced to slavery, that he could not lawfully exact from them any personal service whatever. The system of *encomiendas* was introduced by the emperor Charles V.; and though variously modified and changed by his successors, it was not finally abolished till the reign of Philip V. All accounts agree, that, however well intended, it was in its effects oppressive and injurious to the Indians. The *encomendero* was continually exacting from them more than he was entitled to demand, and doing for them less than he was bound to perform.

The system of *encomiendas* was followed by the still more fatal plan of *repartimientos*; according to which the government, in consideration of the limited faculties and improvident character of the Indians, directed the *corregidor* or judge of the district in which they lived, to supply them with cattle, seed-corn, instruments of agriculture, and even clothes and other necessaries of which they were in want, according to his discretion and opinion of their necessities; but at a price regulated by law, and without any profit to himself. The abuses to which this system must have led, may easily be conceived. They became at length so enormous, as to call again for the interference of the government, which, after mature deliberation, determined on abolishing the *repartimientos*. This was accordingly done in 1779.

The system followed at present with regard to the Indians, is more consonant to reason and justice, and more favourable to the development of their faculties, than any under which they have lived since the conquest. They are left to manage their own concerns as they please; and no one, under pretence of doing them good, can interfere with the disposal of their time or their property. It must be confessed, that, in some parts of the country, the indolence and sluggishness

of their character have so far prevailed, since they were taken from under the controul of the corregidor, that they have suffered the breed of mules, so necessary for the mines, to decrease; but in other parts they have been roused to greater industry and exertion. At Lambayeque, in particular, they have applied to agriculture, manufactures and commerce, with such assiduity, as far to surpass the Spaniards; and as the produce of their farms and industry is exempt from the alcabala, and all other taxes, they have great advantages over the other castes, of which they want only industry and ability to make a proper use.

The Indians pay a personal tax or tribute, which is extremely moderate, and to be regarded rather as a distinctive mark and token of vassalage, than as a serious burden. Indians of noble birth, that is, of the families from which the caziques are taken, enjoy an exemption from tribute, and are equally qualified with Spaniards to fill all kinds of offices under the crown. Where the Indians are the sole inhabitants, they are governed by their caziques; and none of the other castes are permitted to encroach upon their lands, or to settle among them, without their consent.

The Indians are subject to another burden, the mita, or compulsory labour in the mines. Every male Indian from 18 to 50 must take his share in this service; and, for that purpose, a list is kept of all the Indians of the requisite age, who are divided into seven parts, each of which serves in its turn. The term of service lasts for six months; and, therefore, returns once in three years and a half. The mitayo, when it comes to his turn, is forced to leave his farm or other occupation, and go to the mine where he is ordered to serve. Some Indians are compelled to travel 200 or 300 leagues from home; and many take their families with them to the mines. They have a small allowance for their travelling expenses, and receive, for their work in the mines, at least have a dollar a day, and, in general, a greater sum.

The Indians and Mestizoes are the only castes in America who are able to endure the fatigue and unwholesomeness of the mines. The Spaniards and Negroes have been often tried in this species of labour, but they always sink under it after a short time. Besides the mitayos, there are Indians who serve voluntarily in the mines, and engage themselves for a stipulated hire. The greater part of the miners is indeed of that description; and it is to be regretted, that there should be any persons who serve upon other terms. A more intolerable hardship, and more flagrant injustice than the mita, cannot well be imagined. A forced conscription for national defence, though liable to great abuse, is on every principle a justifiable measure; but a forced conscription, for the purpose of digging riches from the bowels of the earth for the profit of another, is the extremity of cruelty and injustice.

The number of Indians in South America has diminished considerably since the conquest; and as the other castes have not increased in a degree corresponding to this diminution, the whole population of the country is less than when first discovered by the Spaniards. The first census after the conquest was made in 1551, when the Indian population of Peru, Santa Fé, and Buenos Ayres, amounted to 8,255,000 souls; but the same countries hardly contain, at present, four millions of inhabitants, of all classes and descriptions. A second enumeration of the Indians was made in 1581, by D. Francisco Toledo, viceroy of Peru, previously to the establishment of the mita; from which it appeared, that Peru and Potosi, without including Quito, Tucuman, Chili, or Buenos Ayres, contained, at that time, 1,067,697 male Indians, from 18 to 50, making a total population of at least 4,270,788 persons. But the whole population, from Tumbes to Buenos Ayres, does not exceed, at present, two mil-

lions and a half, or three millions of souls. Of whom not more than one-third are Indians.

Independent of these computations, there are many proofs of Peru having been formerly more populous and better cultivated than it is at present. Vestiges of former cultivation, and remains of extensive works for irrigation, are still to be seen, where the country is now uncultivated and deserted; and travellers meet continually with the ruins of towns and villages, which have been long since abandoned, and without inhabitants.

That this devastation is to be attributed, in a great measure, to the mistaken policy, not to the inhumanity of the Spanish government, cannot be doubted; but many other causes have contributed to thin so dreadfully the number of the Indians. The abuse of spirituous liquors destroys vast numbers of them. Ulloa alleges, that the use of spirits is fatal to more Indians in one year than the mines are in fifty. The Indians of the Sierra are so immoderately fond of ardent spirits, that they are often found dead in the fields at break of day, from the intoxication of the preceding evening. In 1759, the government was compelled to prohibit entirely the sale and manufacture of spirits, on account of an epidemic fever then raging among the Indians, which owed its destructive power in a great measure to their habits of intoxication. The small-pox and measles make also great havoc among them; and a pestilential fever, which broke out in 1720, swept away the inhabitants of whole villages, and caused every where the greatest mortality. Another cause, which is continually diminishing the number of the Indians, and which must, in the end, extinguish them as a separate race, is the progress of the other castes. It is observed, that wherever the Indians are settled along with the Spaniards, their numbers decrease; but as their place is supplied with Mestizoes and Samboes, this loss is not to be deplored, but viewed as the indication of a future period, when all the pure races, whether Creoles, Indians, or Negroes, will be lost and confounded.

Both the Peruvian Indians and the Creoles are remarkably long lived, and retain their vigour and bodily faculties to a very advanced age. In the small province of Caxamarca, containing hardly 70,000 inhabitants, there were eight persons alive in 1792, whose ages were 114, 117, 121, 131, 132, 135, 141, and 147; and in the same province, a Spaniard died in 1765, aged 144 years, 7 months and 5 days, leaving 800 persons lineally descended from him.

The Mestizoes, or offspring of the Spaniards and Indians, are the next class in rank to the Spaniards, and the most numerous after the Indians. They have neither the privileges and exemptions of the Indians, nor are they subject to the same burdens. They are cordially attached to the Spaniards, but constantly at variance with the Indians. The Quarteroons, or offspring of the Spaniards and Mestizoes, are hardly to be distinguished from Spaniards. The Cholos, on the contrary, sprung from the Indians and Mestizoes, are classed with the Indians, and subjected to tribute.

The Negro slaves in Peru are either employed in domestic service, or on the sugar plantations and farms of their masters. About 500 negroes are annually imported from Africa, formerly by Panama, but now by Chili and Buenos Ayres. The free negroes, who are very numerous, are in general idle and disorderly, and the authors of most of the murders and robberies committed in the kingdom.

The Mulattoes are called by Spanish writers the gypsies of South America, on account of their resemblance in complexion, manners, and character to the Spanish gypsies. The female mulattoes are usually employed by the Creole ladies as wet nurses for their children; and they often acquire

quire the confidence and entire management of their mistresses. The free mulattoes are usually tradesmen, and several mechanical trades are chiefly in their hands.

The language of the ruling people in Peru was called the "Quechua;" and it is still cultivated by the Spanish clergy as indispensable in the conversion of the natives. The Quechua is declined by altering the termination, as "Runa" a man, "Runap" of a man, "Runapac" to a man, &c. The verbs have also moods and conjugations, the terminations extending to great length. In this dialect, the letters *b, d, g, r, x, z*, are wanting. The grammar of this language, and it is said even that of the Tehuels (see PATAGONIA) is nearly as variegated and artificial as the Greek; a circumstance which may serve to abate our wonder at the refinement of the Sanscrit. Mr. Pinkerton has given in his "Geography" specimens of this celebrated dialect of the Incas.

We now proceed to the geographical division of the viceroyalty of Peru. Its provinces, or districts, proceeding from S. to N. are as follow: *viz.* Arica, Arequipa, Canes and Canches, Paucartambo, Chilques, Chumbivilcas, Guancavelica, Aymaraez, Cotabamba, Cuzco, Abancay, Calca y Lares, Andahuaylas, Parinacochas, Lucanas, Ica, Castrovireyna, Vilcashuaman, Huanta, Angaraes, Yauyos, Canete, Guarohiri, Jauja, Tarma, Canta, Checras, Huanuco, Caxatambo, Santa, Huaylas, Conchucos, Paftas, Caxamarca, Huamachucos, Truxillo, Sana, Caxamarca, Chacapoyas, Lamas, Luya y Chilloas, Piura, and some other small districts.

The most southern province is that of Canes and Canches, bounded or pervaded by the Apurimac or genuine Marañon. The name is derived from two tribes, who originally occupied the country, and who were conquered by Roca, the second Inca. This province abounds in cattle and sheep, and also pacos; and in the heights and skirts of the Cordilleras there is also a great number of guanacos, vicuñas, paco-chas, venados, or a kind of deer, viscachos, or a kind of rabbits, partridges and quails, and many birds of prey; the mountains contain gold, silver, copper, loadstone, lead, tin, and quicksilver. The language of this district is the Quechua; the chief town is Siquani, containing about 6000 persons, but only 92 Spaniards. The articles of culture are papas, or a kind of potatoe, beans, wheat, and barley. The province is governed by a judge, who is a delegate of the Intendant of Cuzco. The trade consists in cattle and woollen cloths; but the most flourishing business is the weaving. The Indians bring wine, brandy, and cotton from the coast.

The government of this viceroyalty is divided, like that of the others, into political and ecclesiastic. By the new constitution there are seven intendants, and fifty-two sub-delegates; all subordinate to the viceroy. The royal audience, created in 1543, (see AUDIENCE,) is now composed of a regent, an office created in 1776, eight oidors or judges, four alcalds of the court, and two fiscals, the viceroy being president. It is divided into three chambers. There is also a superior junta of the royal treasury, composed of the viceroy, the regent, the dean of the tribunal of accounts, and other officers. The tribunal of accounts determines causes of the revenue. See LIMA.

According to Estalla, the population of this viceroyalty, by a census very recently taken, amounts to 1,076,122 persons of all denominations, *viz.* Spaniards, Indians, and Negroes, from the mixture of which result various casts and colours: and the number of towns and villages is computed at 1460. But this census is said to have been carelessly taken, and that the returns were considerably under the real population. The highest estimate does not raise them above

1,400,000 persons, and the more probable opinion is, that it does not exceed 1,300,000. Lima may be called the maritime capital of Peru, and Cuzco the inland metropolis. The other cities or chief towns of the viceroyalty of Peru, are the bishoprics of Arequipa, Guamanga, and Truxillo. Arica and Oropesa have declined; nor is Piura of much consequence. For an account of the other chief districts and towns, see their respective titles.

The revenue of Peru amounts to near 5,000,000 of dollars annually; of which 300,000 are remitted to Panama; 15,000 to the isle of Chiloe; and a third sum to Valdivia. The clear revenue, after these remittances, and after defraying the expence of the government of Peru, does not exceed 500,000 dollars; and we are disposed to regard that sum as the total revenue which the king of Spain derives from this part of his dominions.

The commerce of Peru may be considered under three divisions; *viz.* that by Cape Horn, that with the ports on the Pacific, and that of the interior with the southern provinces. Since the freedom of commerce in 1778, the principal trade of Peru has been carried on by Cape Horn. The exports and imports have been nearly doubled since the freedom of commerce has been allowed, though several rich provinces have been withdrawn from the viceroyalty.

The exports of Peru, in a general view of them, are gold and silver, wine, brandy, sugar, pimento, Jesuits' bark, salt, Vicuña wool, coarse woollens, and some other manufactures of little value; and it receives, in return, European goods, live stock, provisions, tallow, cacao, Paraguay tea, coca leaf, indigo, timber, cordage, pitch and copper.

As luxury of dress is the predominant passion in Peru, and especially at Lima, silks, superfine cloths, fine linen, &c. form considerable articles of imports. Iron is also indispensable in the mines and in agriculture. Most of the linens are from Brittany, with a few from other parts of France and Holland: the cottons, woollens, and silks are chiefly Spanish. The annual demand for rough iron is 6000 hundred weight, besides many articles of hardware. Mercury, wax, paper, pepper, saffron, medicines, liqueurs, books, glass, and furniture, form also principal articles of import.

Lima carries on a considerable commerce with various ports of the Pacific. The fertile and opulent kingdom of Chili supplies abundance of grain and fruits, so that its mines, though they produce annually 1,400,000 dollars, are regarded as of secondary importance; the three havens of Valparaíso, Concepcion, and Coquimbo, furnish convenient outlets for its opulence. Lima annually imports from Chili vegetable products amounting to more than 1,100,000 dollars. Wheat forms the chief article sent by Chili to Peru; but slaves from Africa, salted meat, soap, wine, copper, dried fruits, saffron, &c. &c. form also considerable articles. The returns from Peru are European goods, sugar, cloths of home manufactory, pita, which yields a kind of flax, rice, chocolate, &c. See CHILI.

The ports of the viceroyalty of Peru, which are chiefly frequented, are those of Arica, Ilo, Iquique, and Quilca: these are called "intermediate," and belong to the intendancy of Arequipa, and, with Pisco, in the district of Ica, form the whole number in the viceroyalty to the S. of Lima. Towards the N. are those of Chancay and Guacho, both in the province of Lima; Guanchaco, Pacasmayo, and Payta, in the intendancy of Truxillo. With the southern ports, the trade is wine, brandy, iron, dried fruits, copper, tin, lead, &c.; with the northern, in wool, cotton, cordovan, rice, chocolate, and salted fish; Lima chiefly carrying from the northern ports to the southern, and the contrary.

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The chief markets and most populous towns are on the coast, Piura, Lambayeque, Truxillo; and, in the Sierra, Caxamarca, the royal station of the mines of Chota; and towards the S. Ica, Arequipa, and the royal station of Tarapaca; and towards the interior, Pasco, which is a mineral station belonging to the intendancy of Tarma, Guanacha, Jauja, Guancavelica, Guamanga, and Cuzco. At these and other places, as Guarochiri, Caxatanbo, &c. traders or agents sell for the merchants of Lima, European goods, liquors, and other articles sufficient for the consumption of the neighbourhood; and the returns are generally in bullion or coin, but sometimes in articles of food for the use of the capital. The trade may yearly amount to 1,500,000 dollars in products; while that in bullion and money may amount to 4,000,000.

Upon the whole, according to Liguanda, cited by Pinkerton, the viceroyalty loses, during five years, in the balance of maritime commerce, more than 6,500,000, but gains a balance with the viceroyalty of La Plata of nearly 1,200,000 annually; so that the amount being deducted, the loss will be reduced to about 700,000 dollars, without mentioning the interior commerce, which cannot enter into the account.

From the "Mercurio Peruano," we learn that the ex-

ports of Peru to Potofi, and the other provinces of the Rio Plata, are valued at more than 2,000,000 of dollars annually, and the imports at 860,000 dollars; so that the balance in favour of Peru is near 1,200,000, independent of the profits on the carriage of the goods, which belongs also to Peru, as the carriers are Peruvians. Cuzco and Arequipa are the routes through which this trade passes.

The chief exports to the Rio Plata are brandy, wine, maize, sugar, pimento, indigo, and woollens. The brandy alone amounts to near 1,000,000 of dollars. The woollens, which are next in value, are chiefly made in Peru, but part of them are brought from Quito. The provinces of the Rio Plata used formerly to take woollens, to a great amount, from Quito; but it is now found more economical to procure these articles from Europe by the way of Buenos Ayres. The indigo exported from Peru is previously imported from Guatemala.

The chief imports from the Rio Plata, are mules, sheep, hams, tallow, wool, coca leaf, paraguay leaf, and a small quantity of tin from Oruro: 20,000 mules are imported annually from Tucuman, for the service of the mines.

The commerce of Peru, by sea, with the other colonies of Spanish America, will appear from the following tables.

## I.—Commerce of Callao with Chili, Guayaquil, Panama, and Guatemala, for the Years 1785, 1786, 1787, 1788, and 1789.

	Imports.	Exports.	Balance for Callao.	Balance against Callao.
Chili - - - - -	5,533,775 1	4,686,423 3		847,351 6
Guayaquil - - - - -	2,547,643 1	2,906,305 0	358,661 7	
Panama - - - - -	59,035 5	201,631 7	142,596 2	
Guatemala - - - - -	210,295 7	29,416 4		180,879 3
	8,350,749 6	7,823,776 6	501,258 1	1,028,231 1
Annual Average - - - - -	1,670,149 7	1,564,755 3		
Annual balance against Callao	-	-	-	105,394 4

## II.—Commerce of Arica, Payta, and other Ports of Peru, with the Kingdom of Chili, and the Ports of Panama and Guayaquil.

	Imports.	Exports.	Bal. against Peru.
Chili - - - - -	46,675		46,675
Panama and Guayaquil	350,000	130,000	220,000
	396,675	130,000	266,675

## III.—Result of both.

Annual trade of Peru, by sea, with the other colonies	Imports.	Exports.	Bal. against Peru.
	2,066,824 7	1,694,755 4	372,069 4

Forty-one vessels, of different sizes and descriptions, are employed in this trade; and all of them, except three, belong to Peru. Their united tonnage amounts to 351,500 quintals, and they are manned by 1460 seamen.

The chief exports from Peru to Chili are European goods, previously imported at Callao. Sugar, coarse woollens, made in Peru, indigo from Guatemala, salt, cotton, pita, yarn, and some other trifling articles. The imports are

chiefly wheat, copper; Negro slaves, some of them natives of Chili, but the greater part from Rio de Janeiro and Buenos Ayres; tallow, wine, paraguay tea, salt meat, timber, cordage, and leather. Part of the copper is used in the mint at Lima, and the remainder, except a small quantity sent to Guayaquil, re-exported to Spain. The ports of Chili that trade with Peru, are Valparaiso, Concepcion, and Coquimbo; but Valparaiso alone carries on three times as much trade as the other two. The timber is brought from the isle of Chiloe.

Three-fourths of the exports to Guayaquil consist of European goods, and the remaining fourth of flour, wine, brandy, and copper. The imports are chiefly cacao and timber. There is also imported into Peru, on account of the government, a considerable quantity of tobacco, the growth of Guayaquil, which is afterwards re-exported to Chili; but this is not included in the preceding tables.

The trade with Panama, which was formerly of such magnitude, has declined since the middle of the last century, and is now reduced to a small importation of timber and cacao, and to the remains of a slave trade, which is every day diminishing. The exports from Peru to Panama are coarse woollens, sugar, flour, and brandy. There is also a remittance of 300,000 dollars a-year from the treasury of Lima, to pay the garrison and civil government of Panama; without which that city must have fallen to still greater insignificance.

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Indigo is the principal article of import from Guatimala. Small quantities of logwood, pitch, timber, and cacao, are also imported. The exports, which are very trifling, consist chiefly of wine and woollens. The wines and brandies of Peru might be exported with advantage to San Blas, for the consumption of Cinaloa, Sonora, and California; but though permission has been frequently solicited from the government, it has been constantly refused, from an apprehension of interfering with the trade of the mother country in these articles.

The trade of Peru with Spain was carried on by Porto Bello and Panama till 1748, when register ships were substituted for galleons, and the voyage by Cape Horn, for the circuitous route formerly in use. It is amusing to consider the progress made since that time in the art of navigation. The first Spanish vessels which sailed by Cape Horn, were insured against sea risk at Cadiz, at the exorbitant rate of 20 *per cent.* of their value; but the vessels which perform the same voyage at present are insured for two. The register ships, though liable to objections, were preferable in every respect to the galleons. They shortened the intercourse between the mother country and the colony, and lessened the expence attending it. By affording quicker returns, they led to more frequent adventures; and by meeting more effectually the demand, they diminished the inducements to contraband. But the trade was still clogged and impeded with much useless expence and unnecessary delay, and subjected to an arbitrary licence, which was withheld or burdened with restrictions at the caprice of the minister.

The register ships continued to be employed in the trade of Peru with the mother country, till the war for American independence, during which there was little intercourse between Spain and this distant colony. At the peace of 1783, the system of free trade, the order for which had been issued at Madrid some years before, began to be carried into effect

in the South Sea. According to this system, the most wise and liberal which Spain has ever laid down for her colonies, an unlimited intercourse, without licences or other restrictions, is permitted between certain ports of Spain and certain ports of Spanish America; and among the privileged ports of America, are Callao and Arica, both situated in Peru.

The result of these innovations has been highly favourable to Peru. Its inhabitants enjoy foreign luxuries and conveniences at a cheaper rate, and in greater abundance than before; while their industry has been excited, the value of their exports increased, and the produce of their mines nearly doubled. Nor has the change of system been less beneficial to the mother country, though some individuals have suffered by it. From 1714 to 1739, a period of twenty-five years, the whole exports to Spain from Peru, Chili, the Rio Plata, and Santa Fé, did not exceed 34,000,000 of dollars. But at present, the exports from Peru and Chili alone, exceed 6,000,000 annually; and the imports from Europe have increased in the same proportion. For some years, indeed, after the opening of the free trade, the merchants of the mother country, ignorant of the real state and resources of Peru, poured into that country a greater quantity of goods than its effective demand required, or enabled it to consume; and by the consequent want of sale, and depreciation of these goods, the importers paid dearly for their rashness. But though some merchants suffered by their over-speculation, the manufactures of the mother country were benefited by it; and with regard to Peru, it would be difficult to shew how the abundance and low price of goods could be injurious to the consumer. On the contrary, the spirit of industry has been awakened in that kingdom, by the sight of luxuries and accommodations, formerly unknown to its inhabitants, or placed beyond their reach; and the increase of its exports since the free trade, is the surest proof of its growing prosperity.

## TABLES of the Commerce of Peru with the Mother Country.

I.—Imports of Lima from Spain in the Years 1785, 1786, 1787, 1788, and 1789.

		National Goods.	Foreign Goods.	Prime Cost when exported.	Cost, with Duties and other Expences to Lima.
In the year	1785	1,932,040 $0\frac{2}{3}$	3,106,056 $2\frac{3}{4}$	5,038,096 $3\frac{5}{8}$	6,965,231 $3\frac{1}{2}$
	1786	5,113,389 $5\frac{1}{2}$	6,358,901 $5$	11,472,221 $2\frac{1}{2}$	14,734,084 $4\frac{1}{2}$
	1787	3,225,167 $3\frac{3}{4}$	2,426,581 $6\frac{7}{8}$	5,651,749 $2$	7,257,741 $6\frac{1}{2}$
	1788	1,298,250 $7\frac{1}{2}$	995,055 $6\frac{1}{2}$	2,293,306 $5\frac{3}{8}$	2,940,992 $7\frac{1}{2}$
	1789	1,007,663 $7\frac{1}{2}$	1,216,855 $3\frac{1}{2}$	2,224,517 $2\frac{3}{8}$	2,856,965 $0\frac{7}{8}$
Total, according to the Custom-house entry		12,576,510 $0\frac{3}{4}$	14,103,450 $7\frac{1}{2}$	26,679,960 $7\frac{7}{8}$	34,755,015 $7\frac{5}{8}$
	Addition of 22 <i>per cent.</i>	2,727,064 $1$	2,990,428 $5$	5,717,492 $6$	7,344,297 $7$
Total	-	15,303,574 $1\frac{1}{8}$	17,093,879 $4\frac{1}{2}$	32,397,453 $5\frac{7}{8}$	42,099,313 $6\frac{5}{8}$
Annual average	-	3,060,714 $6\frac{5}{8}$	3,418,775 $7\frac{1}{4}$	6,479,490 $5\frac{7}{8}$	8,419,862 $6\frac{1}{2}$

In this table are included imports from China by the Philippine Company to the value of 421,120 dollars; and imports of European goods from other ports of America to the value of 270,237 dollars  $7\frac{1}{2}$  reals.

The addition of 22 *per cent.* to the official value, is considered as the difference between the real and the official value.

The freightage, insurance, duties, and other expences, from the time the goods leave the wharf, when they are embarked in Spain, till they are warehoused at Lima, are estimated at 28 dollars  $3\frac{5}{8}$  reals *per cent.* on all goods sent round Cape Horn. A separate charge is made for the goods from China, and from the American ports.

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The European goods in greatest request in Peru are, ordinary linen, and for the inferior sorts of cloth and woollens. Cutlery, and all instruments of iron, are also in luxury and show. There is also a considerable demand for great request.

## II.—Exports from Lima to Spain in the same Period.

		Coin and Bullion.	Produce.	Total.	Total, with C. ft and Duties, to Spain.
In the year	1785	7,144,325 2½	733,587 4	7,877,912 6½	8,823,115 6½
	1786	8,285,659 7¼	882,807 1	9,168,467 0	10,369,502 3¼
	1787	4,518,246 3¼	906,022 0	5,424,268 3¼	6,503,961 2¼
	1788	5,463,973 1¼	579,160 2	6,043,133 0	6,798,374 0
	1789	2,449,495 6¾	523,080 0	2,972,575 6¾	3,484,386 2¾
Total	-	27,861,700 4¾	3,624,656 7	31,486,357 3¾	35,979,399 6¾
Annual Average	-	5,572,340 1	724,931 3	6,297,271 4	7,195,879 7¾

In this table is included the sum of 2,790,000 dollars exported to Asia by the Philippine Company.

Silver brought from Lima to Spain, costs, in freightage, insurance, and duties, 9½ per cent. ; and gold 2¼ per cent.

The articles of produce are chiefly Jesuits' bark, Vicuna wool, copper from Chili, cacao from Guayaquil, and a small quantity of cotton.

### III.—Commerce of Peru with Spain, from 1775 to 1779, compared with the Commerce between the same Countries, from 1785 to 1789.

	Imports.	Exports.
From 1775 to 1779	- 23,838,183 4¾	21,302,385 2
From 1785 to 1789	- 42,099,313 6¾	35,979,339 6¾
Total for ten years	- 65,937,497 3½	57,281,725 0¾
Excess of the 2d period above the 1st	} 18,261,130 2¾	14,676,954 4¾

It is further to be observed, that during the first of these periods, Potosi, and the other provinces now annexed to the Rio Plata, formed part of the viceroyalty of Peru; and that, by the separation of these provinces, Peru, during the second period, contained only 49 or 51 districts, instead of 74, of which it was formerly composed.

But, to form a just estimate of the commerce of Peru, we must take Buenos Ayres into the account, and consider these two countries, and Chili, as part of the same commercial system. It will then more fully appear, how small are the means, and limited the resources, of these extensive colonies, and what false and exaggerated notions have been circulated in this country with regard to them.

### View of the Resources of Peru, Chili, and the Rio Plata, for maintaining Foreign Commerce.

	Dollars.
Annual coinage of Lima, from 1790 to 1794	5,593,513 0
Coinage of Potosi in 1791	4,365,175 0
Annual coinage of Santiago of Chili, estimated at	1,400,000 0
Annual export of produce from Callao, from 1785 to 1789	724,931 3
Export of produce from Buenos Ayres in 1796	1,328,840 0
	<hr/> 13,412,459 3

It appears from this statement, that the effective demand of these countries for foreign commodities, does not exceed, at present, 3,000,000 sterling annually. It is true, that with a better government, and a more liberal system of commercial regulations, these resources might be greatly augmented, but such improvements are in general the work of time, and in South America, many difficulties must first be surmounted. The population of the country is wonderfully small, scattered over an immense surface, and composed of castes which mutually hate and distrust each other. The Indians, who are the most numerous class, prefer a life of indolence and apathy, to enjoyments that must be purchased with labour. Among the other castes, emancipation from the mother country would be the signal of discord and political discussions the most adverse, during their continuance, to the progress of opulence, and the steady exertions of industry. Some improvement might be expected in the mines. The labour of extracting the ore might be abridged by machinery, and the processes for reducing it meliorated by more skilful applications of chemistry. But the scarcity of hands would prevent any great increase in the productiveness of the mines; and a separation from the mother country, by increasing the difficulty of finding a supply of quicksilver, might render them even less productive than they are at present. The mines of quicksilver in China are said, within these few years, to have been exhausted. None could be expected from Europe, in the present state of that quarter of the world. No resource would then remain but to repair the works at Huacavelica, and extract from it quicksilver for the other mines, without which, the greater part of them must be abandoned.

In some branches of produce, it is true, the exports from this part of America might be instantly augmented. The exports of hides, tallow, and salted provisions from Buenos Ayres, might be greatly increased. Copper, the value of which is rising every day at home, might be procured, in great abundance, from Chili and the Rio Plata. Valuable firs might be obtained in great numbers from the Andes; and in this species of industry the Indians, like their North American brethren, would more readily engage them in more settled occupations. Flax and hemp of the very best quality are raised in Chili; and if greater care were taken to gather the cotton of Peru, and more attention bestowed on the art of packing, both that article, and the wool of the same country, might be sent to Europe at a price that could not exclude them from the market. Cacao, coffee, dye-

eye-stuffs, and medical drugs, might also be exported in greater quantity.

The viceroyalty of Peru has peculiarities of climate, which are owing to its singular form. The mountains that are extended on the western side of South America occasion a division into three parts, *viz.* the maritime plains or vallies, the mountains themselves, and the high table land or upland plain, between the ridges of the Andes. Where we should be led by theory to expect perpetual rain from the influence of the tropical sun, in the lower part of Peru, on the contrary, rain is almost unknown; and it has been asserted, that in the part between 5° and 15° rain has never been known to fall. The chain of the Andes, at a mean height of 14,000 feet above the sea, arrests the clouds, except during the months of January, February, and March, when the summits are covered with snow. These clouds dissolve on the mountains in rain and vapours, accompanied with lightning and tremendous thunder. In the provinces unvisited by rain, the wind may be said to blow constantly from the south, along the course of the Andes, corresponding with our north wind, which is generally dry; the cold of the antarctic pole being equal, if not superior, to the arctic. Vegetation is supported by liberal dew throughout this region, computed at a length of 10° of latitude, or 600 geog. miles, while the breadth may be from 12 to 15 leagues. Bouguer observes, that from the gulf of Guayaquil to the desert of Atacama, a space of 400 leagues, rain is unknown; and the houses at Arica, like those of Lima, may be said to have no roofs, being only covered with mats, and a light sprinkling of ashes to absorb the dew of the night. The high table land, called the "Sierra," or High Peru, presents a more fertile aspect, and from its height of 10,000 feet above the sea enjoys a different climate. While the low lands are rather sandy and barren, except along the course of the rivers, the uplands may be said to enjoy a perpetual spring, united with a perpetual autumn. The height of the mountains invests them with perpetual winter.

In Low Peru, as that part of the country is called which lies between the Cordillera of the coast (thus distinguishing it from the Cordillera of the Andes) and the shore, the soil is dry and has no rain; and, therefore, the only spots capable of cultivation are the banks of the rivers, and the places susceptible of being artificially irrigated. The Sierra, or High Peru, though at its greatest elevation it consists of barren mountains and rocks, is intersected with fertile and cultivated vallies. Its climate, though variable, is not insalubrious, if we may judge from the longevity of its inhabitants. The climate of Lima, under the want of rain, is remarkable for the inconsiderable variations of its temperature. The thermometer at noon is never observed in winter below 60° Fahrenheit, and seldom rises in summer above 85°. The hottest day ever known at Lima was in February 1791, when the thermometer rose to 96°.

It is obvious, therefore, that the first object of attention in Peru ought to be, not its agriculture, but the improvement of its mines, and the amelioration of its roads and internal communications. In proportion as a market is opened for its productions, the attention of its inhabitants will be turned towards agriculture; and without such inducement, it is fruitless for the government to attempt forcing their industry into that channel. So languid and backward is the agriculture of Peru at present, that Lima, and many other towns upon the coast, depend on Chili for their provisions. This has been the case ever since the earthquake of 1693, which was followed by such sterility of the vallies of Low Peru, that the people ceased in many places to cultivate them; and though the country has since recovered, in a

great measure, its former fertility, it still remains uncultivated, and the maritime places continue to be supplied with provisions by importation.

Deserts of 20, 30, or 40 leagues in extent occur in every part of the coast from Tumbes to Atacama. The immense forests which clothe the maritime plains indicate that the population has been always scanty. These forests consist of acacias, mangle trees, brooms and ferns in prodigious variety, with tall aloes, and other succulent plants. Here we find the ferula or gigantic fennel, cedars of different kinds, cotton trees, many sorts of ebony, and other woods. The tallest tree is the "maria," used for masts; and of the palm trees there are ten or twelve kinds. At the distance of seven or eight leagues from the coast the trees increase in size, and are often clothed with parasitical plants. On passing the first chain of the Andes, the traveller finds the new region already described, and the face of the country as different as the climate.

As to the botany of this country, we know from the reports of travellers and navigators, that the vicinity of the coast produces many of the tropical plants and vegetables, such as the cabbage-palm, the cocoa nut, the chocolate nut, the cotton shrub, the pine apple, the canna, amomum, turmeric, plantain, and sugar cane; and, in the more temperate climate of the high plains, and upon the sides of the Andes, it is natural to expect more hardy plants. The best and the most interesting of these are the several species of cichona. Here are also found the cardana alliadora, which is a large timber tree, whose leaves and fresh wood emit a smell of garlic; and the coffea racemosa. Around the neighbourhood of Lima, the large-flowered jessamine and datura arborea diffuse their evening fragrance. Among the Peruvian natives are reckoned no fewer than twenty-four species of pepper, and five or six of capicum, besides several esculent kinds of solanum. Tobacco and jalap abound in the groves at the feet of the Andes, and many of the ornamental flowers of our English gardens and green-houses owe their origin to these countries.

The zoology of Peru is little different from that of *La Plata*; which see.

In exploring the mineralogy of the Peruvian viceroyalty, it is found that, from the extreme province of Piura in the north to that of Canes and Canches in the south, gold and silver follow the grand chain of the Alps; and though this country has lost Potosi and the southern provinces, which have been annexed to the viceroyalty of *La Plata*, the amount of the coinage of Lima exceeds that of Potosi. In Piura, at Hayabaca, muriate of copper has been found; and in the village called Amatape, 16 leagues from the town of Piura, is a celebrated mine of pitch or bitumen; and another mine has been more recently discovered, at the point of St Helena, in the jurisdiction of Guayaquil.

From the Mercurio Peruviano, cited by Mr. Pinkerton, we deduce an account of the chief mines, with the names of the new intendancies, the most modern division of the viceroyalty, in which they are found. In the intendancy of *Lima*, with its dependency of *Guarachiri*, there are four mines of gold, 131 of silver, one of quicksilver, and four of copper; all of which were wrought in 1791, when this enumeration was taken. In the intendancy of *Tarma*, with its dependencies of *Pasco* and *Huallanca*, 227 mines of silver were actually wrought, 21 being neglected; and here were two lead mines, which furnished an abundant supply of this metal. In the intendancy of *Truxillo*, with its dependency of *Chota*, two of three gold mines, and 34 silver mines were worked, and 161 were abandoned. In the intendancy of *Guamanga*, with its dependency of *Lucanos*, 60 mines of

gold, 102 of silver, and one of quicksilver, were wrought; three mines of the first metal and 63 of the second having been abandoned. In the intendency of *Cuzco*, with its dependency of *Curahuasi*, 19 mines of silver were wrought. In the intendency of *Arequipa*, with its dependency of *Cailoma*, one mine of gold, and 71 mines of silver were wrought; four of the former metal and 28 of the latter having been abandoned. In the intendency of *Guantajaya*, with its dependency of *Tacna*, one mine of gold, and 20 mines of silver were wrought; 19 of the former metal and also 30 of silver having been abandoned. In the intendency of *Guanacavelica*, with its dependencies of *Castrovirayna* and *Lirca*, one mine of gold, 80 mines of silver, two of quicksilver, and ten of lead, were wrought; two of gold and 215 of silver having been abandoned. It is observed, that during a space of ten years, from the commencement of 1780 to the end of 1789, the above mines yielded 35,359 marks of gold, 22 carats fine; and 3,739,763 marks of silver. In the year 1790, the silver mines yielded 412,117 marks of that metal; being an excess of 38,147 marks over the average produce of the ten antecedent years. If we estimate the mark of gold at 125 piastres, and that of silver at eight piastres, the whole amount, in sterling money, of the produce of the mines, during the above ten years, will be found to have been 7,703,545*l*. Among the mines of Peru the most celebrated seem to be those of Cailloma, Pasco, Piedra-Parada, and Chota.

Peru produces a great number and variety of other minerals; such as basalt, the stone of the Incas, which is a compact marcasite capable of a high polish, the piedra del gulinazo, or obsidian, rock salt, besides curious stones of various colours. Ulloa's Voyage. Pinkerton's Geography, vol. iii. Mercurio Peruano. Edinb. Rev., No. 18.

PERU, a post-town of America, in Clinton county, New York, on the west side of lake Champlain; incorporated in 1791, and containing 1347 inhabitants.

PERU, *Balsam of*. See BALSAM.

PERVENCHERES, in *Geography*, a town of France, in the department of the Orne, and chief place of a canton, in the district of Mortagne. The place contains 771, and the canton 9728 inhabitants, on a territory of 190 kilometres, in 14 communes.

PERUGIA, anciently *Perusina*, one of the most ancient and distinguished cities of Etruria. The era of its foundation long preceded that of Rome, and, like the origin of "Clusium, Cortona," &c. is almost lost in distance of time. In conjunction with all the other Etrurian states, it long resisted the Romans; and when subjected, or rather reconciled to them, it became a faithful and courageous ally. It defied the power of Hannibal, and flourished in peace and opulence till the reign of Augustus, when unfortunately it engaged in the rebellion of Lucius Antonius, uncle of the triumvir, and under his command shut its gates against Augustus, who took it, and, as it is asserted, wished to spare it; but one of its principal citizens setting fire to his own house, which he intended as a funeral pile for himself and his family, the flames communicated to the neighbouring buildings, and spreading rapidly, reduced the city to ashes. Perugia, however, rose immediately from its ruins; and, on its restoration, by a strange inconsistency, chose for its patron Vulcan, a divinity to whom it seems to have had very few obligations, as the god had spared his own temple only in the general conflagration. In the Gothic war it displayed much spirit, and stood a siege of seven years against these barbarians. It afterwards, with the whole Roman state, submitted to the pope; and, with some

intervals of turbulent independence, has remained ever since attached to the Roman see.

Perugia is now a large, clean, well-built, and well-inhabited city. Seated on the summit of a mountain, it commands from its ramparts, and particularly from its citadel, an extensive view over a vast range of country, fertile, covered with hill and dale, and enlivened with villages and towns. There are many churches, convents, and palaces in this city, most of which were adorned with the paintings of Pietro Perugino, the master of Raffaello: of these the French carried off a considerable number, and defaced others, particularly such as were painted on walls, and could not be removed. The cathedral is in itself a very indifferent edifice, and its deformity is increased by the bad taste that seems to have prevailed in its repair and decorations. Several other churches merit attention, particularly that of St. Pietro, belonging to a Benedictine abbey: it is supported by eighteen pillars of fine marble, and adorned with an altar of the same materials, very rich and well disposed. Perugia has an university supplied with able professors, and several academies, all of which can boast of illustrious names; and it is upon the whole an interesting city, capable of entertaining the curious and inquisitive traveller for several days; 60 miles S.E. of Florence. N. lat. 43° 6'. E. long. 12° 17'.

PERUGIANO, a province of Italy, bounded on the north by the duchy of Urbino, on the east by Umbria, on the south by the Orvietan, and on the west by Tuscan; its greatest extent from north to south, and also from east to west, being 28 miles. It is crossed from north to south by the Tiber, and in it is a large lake, abounding in fish, called "Lacus Thrafiemenus," near which Flaminius was defeated by Hannibal. The country is very fertile, and abounds in corn and wine. Its capital is *Perugia*; which see.

PERUGINO, PIETRO, in *Biography*, whose real name was Pietro Vanucci, was born at Perugia in 1446, of parents very low in station, but who finding in their son an inclination to painting indulged it, and placed him with an artist for instruction, under whose tuition he eagerly exerted himself, and acquired by his industry a degree of power very considerable among the earlier practitioners of the art.

He advanced still more with the assistance of Andrea Verrochio, and his talents were repaid with very great respect, particularly for a picture he painted of St. Jerome devoutly praying before a crucifix, which so raised his reputation, that his works were eagerly sought for through all the south of Europe.

Though Perugino thus obtained distinction as a painter, and very honourable employment, having considerably improved upon the style of his masters; yet he was very far indeed from successful rivalry with the powers of Masaccio. He was dry and hard in design, and too laboriously minute in finishing. His greatest glory arises from having been the first instructor of Raffaello; but his pupil, as soon as he beheld the grander style of Michael Angelo, L. da Vinci, and Fra. Bartolomeo, burst the bonds of the meaner style in which he had been educated, and left his master at a very humble distance.

The most capital work of Pietro Perugino in oil colour, is in the church of St. Peter at Perugia. It is an altar piece, and the subject is the ascension of our Saviour, with the disciples observing and adoring. He died in 1524, aged 78.

PERVIGILIA, in *Antiquity*, an appellation given to nocturnal festivals, celebrated in honour of several deities, as Ceres, Venus, Fortune, &c. They were so called because the nights were spent in waking.

PERVIGILIUM, in *Medicine*, excessive waking, or watching.

PERVINCA, in *Botany*. See VINCA.

PERUIPE, in *Geography*, a river of Brazil, which runs into the Atlantic, S. lat. 18° 20'.

PERVISE, or PARVISE, a term in our old *Law Books*, signifying, according to Selden in his notes on Fortescue, an afternoon's exercise, or moot, which the pleaders held for the instruction of the younger students; bearing originally the same name with the parviziæ in Oxford. See MOOT.

Mr. Somner says, that pervise signifies *palatii atrium, vel area illa a fronte aule Westmonasteriensis, hodie, the Palace-yard*: and Spelman thinks, that the lawyers turned thither to meet their clients, not to hold moots.

PERULA, in *Botany*, so altered by Schreber, from *Pera*, the name given by Mutis, which alludes to the form of the capsule, resembling a little bag or fatchel. Schreb. Gen. 703. Mart. Mill. Dict. v. 3. (*Pera*; Mutis in Stockh. Transf. for 1784. 299.)—Class and order, *Diœcia Polyandria*. Nat. Ord. *Tricocca*, Linn. *Euphorbiæ*, Juss.

Gen. Ch. Male, *Cal.* Perianth of two minute, opposite, oblong, rather concave, spreading leaves, the uppermost of which is twice the largest. *Cor.* of one petal, concave, hemispherical, dependent; heart-shaped at the base; scarcely emarginate at the summit. Nectary of several small, many-cleft, somewhat plaited, erect membranes, inserted into the receptacle between the two rows of stamens. *Stam.* Filaments numerous, (from 24 to 30,) disposed transversely in a double row, thickish, erect, the height of the nectary; anthers thickish, quadrangular, oblong, obtuse, erect, rising above the nectary. *Pist.* Germens four, barren, minute, nearly globular, placed on very short stalks at the angles of the receptacle above the nectary; style very short, erect; stigmas three, in minute peltate segments, with prominent points.

Female, on a separate tree, *Cal.* Perianth as in the male, deciduous. *Cor.* as in the male. Nectary as in the male, but its membranes are approximated, somewhat inflated, occupying all the disk of the receptacle. *Pist.* Germens four, fertile, inserted into the receptacle as in the male, but rather larger, on short stalks; style to each erect, short, triangular; stigmas as in the male. *Peric.* Capsule obovate, slightly triangular, hanging out of the flower on its own elongated stalk, of three cells and three valves; the valves cloven, and finally divided to the very bottom. *Seeds* solitary, obovate, abrupt, smooth, small.

Obf. Mutis suspects that what he has called calyx, may be bractæas. In this we readily concur. We would also call his corolla the calyx, concerning which point, if we are right as to the natural order, there can be no doubt. The part in question is, according to him, globose before its expansion, with a longitudinal suture, by the bursting of which the original or proper orifice becomes transverse, the receptacle projects almost out of this corolla (or calyx), the flower becoming pendulous from the slightly drooping summit of the incurved flower-stalk. Under this view of the subject, we propose the following.

Eff. Ch. Male, Calyx concave, of one leaf. Petals none. Nectary a plaited membrane. Anthers quadrangular, simple. Germens four, abortive.

Female, Calyx concave, of one leaf. Petals none. Nectary a plaited membrane. Capsule stalked, obovate, of three cells and three valves. *Seeds* solitary.

1. *P. arborea*. (*Pera arborea*; Mutis as above, t. 8.)—Native of New Granada, about Mariquita, where it was found by Mutis. *Martyn*.

Our copy of the Stockholm Transactions being in this Vol. XXVII.

part defective, we have seen no figure of this plant, nor have we any specimen.

PERUVIAN BARK. See CORTEX *Peruvianus*.

PERUVIAN Emerald. See EMERALD.

PERUVIAN Massie Tree. See SCHINUS.

PERUWELZ, in *Geography*, a town of France, in the department of the Jemmappe, and chief place of a canton, in the district of Tournay. The place contains 5302, and the canton 14,962 inhabitants, on a territory of 107½ kilometres, in 14 communes.

PERUZZI, BALDASSARE, in *Biography*, was born at Accajano, in the territory of Sienna, in 1481, in poor and distressed circumstances; his father having been reduced from a state of comparative affluence, by the civil wars which ravaged Florence and its territory. Baldassare exhibited his genius at a very early age; first by imitation of the works of others, and afterwards by original productions in the city of Volterra, where his family resided. Thence he went to Rome, and placed himself with the father of Maturino; and becoming conspicuous for ability, was at length employed by pope Alexander VI., and also in many churches and convents in that city, in which he produced pictures justly entitled to exalted praise.

Together with painting, he studied architecture; and practised it with considerable success. He was also renowned for his knowledge of perspective; and the works he produced in imitation of architectural projections, excited even the surprise and admiration of Titian. But his highest renown is founded upon works of a much more elevated class; viz. his paintings in fresco and in oil; in which he exhibited a taste and style not unworthy of Raphael. There is at Wilton a picture of his of the four evangelists in glory, with their peculiar characteristic accompaniments; which bears ample testimony to the truth of this remark; and perhaps it is the only real specimen of his pencil in England. He wrote a treatise upon the antiquities of Rome, and a commentary on Vitruvius, but did not live to publish them; being poisoned by some who were probably envious of his reputation and talents. He died in 1536, aged 55.

PERWEZ, in *Geography*, a town of France, in the department of the Dyle, and chief place of a canton, in the district of Nivelles. The place contains 904, and the canton 9612 inhabitants, on a territory of 145 kilometres, in 28 communes.

PERYGUA, in *Botany*, a name given by some authors to a plant of the cassine kind, called the *caffiberry* bush, and by some the *Paraguay tea*.

PERYSIAS, a word used by authors to express wine of the last year's vintage.

PERZAGNO, in *Geography*, a town of Albania, on the canal of Cattaro.

PERZENE, a town of Italy, in the department of the Reno; eight miles N.E. of Bologna.

PES, a long measure, in English called foot.

*Pes Forestæ*. See FOOT of the *Forest*.

*Pes Leonis*, in *Botany*, a name by which some authors express the *alchemilla*, or lady's mantle.

*Pes Monete*, in *Ancient Records*, signifies a true and reasonable adjustment of the real value of all current coin.

*Pes Anserinus*, in *Botany*. See CHENOPODIUM and ATRIPLEX.

*Pes Capræ*. See CONVULVULUS and OXALIS.

*Pes Columbimus*. See GERANIUM.

*Pes Tigridis*. See IPOMÆA.

*Pes Anserinus*, in *Anatomy*, the division of the trunk of the

the facial nerve into the ramifications, which spread over the face. See NERVE.

PESA, an old law-term for a weigh, or certain weight of cheefe, wool, &c.

PESADE, or PESATE, in the *Manege*, that action taught a horse, wherein he rises with his fore feet, and bends them up to his body, without stirring the hind feet.

The pesade takes its name from the motion of the horse, which, in this action, leans and lays all the weight of his body upon his haunches. To be perfect, the hinder feet, which support the whole, ought to be fixed and immovable, and the fore-part of the horse more or less raised, according as the creature will allow; but the fore-legs, from the knee to the feet, must always be extremely bent and brought under him.

The pesade is the first lesson taught a horse, in order to bring him to curvets, &c.: unless he performs this well, he will never go well in any air; yet he is not to be taught it at the first riding.

This is the foundation of all the *airs*, (see AIRS.) and is necessary to dispose and prepare the horse for all sorts of maneges: however, great caution should be used not to teach a horse to rise up, or stand upon his haunches, unless he is quite exact and obedient to the hand and heel: for in this case he would be thrown into disorder, his mouth would be spoiled, the appui falsified, and he would become restive. When he is fit for this exercise, work him upon the walk, the trot, and the gallop; stop him in the hand, keep him firm and moderately together; aid with the tongue, the twitch, and your legs; and when he begins to comprehend what you would have him do, encourage and caress him, working him gently and by degrees. Sluggish and heavy horses require, in the beginning, stronger and sharper aids. There are other horses, which are apt to rise of themselves; this should be prevented, by driving them forward. Berenger's Art of Horsemanship, vol. ii. chap. 16.

PESAGE, PESAGIUM, a custom or duty paid in certain markets, &c. for weighing of merchandises, or wares.

PESAGOONDAN, in *Geography*, a town on the W. coast of Borneo. N. lat. 2° 12'. E. long. 109° 58'.

PE-SAN, a small island near the coast of China. N. lat. 26° 52'. E. long. 120°.

PESARO, or PEZARO, a town of Italy, in the duchy of Urbino, at the mouth of the Fogna, on the Adriatic; the see of a bishop, suffragan of Urbino; containing eight churches, and twelve convents. In its environs are hgs and olives, which are much valued. Its ancient name was "Pisaurum:" it was made a Roman colony about A.U.C. 568; and a temple was built here to Jupiter Pisaurus. According to Plutarch, it was ruined by an earthquake, and rebuilt by order of Augustus. Totila, king of the Goths, took and ruined it; but it was afterwards rebuilt by Belisarius, general to the emperor Justinian. It became successively subject to the dominion of the Malatesta, Sforza, and Borgia families, and last of all, of the popes. It is situated upon a small eminence near the Adriatic sea, and pretty well fortified; 15 miles N.E. of Urbino. N. lat. 43° 56'. E. long. 12° 52'.

PESATE, in the *Manege*. See PESADE.

PESCA PAGANI, in *Geography*, a town of Naples, in Basilicata; six miles N.W. of Muro.

PESCARA, a town of Naples, in Abruzzo Citra, at the mouth of a river of its name, which runs into the Adriatic at this place; it is fortified and defended by a castle; 10 miles N. of Civita di Chieti. N. lat. 42° 27'. E. long. 14° 6'.

PESCAROLO, a town of Italy, in the department of the Upper Po; nine miles N.E. of Cremona.

PESCE VACCA, the *Cow-fish*, in *Ichthyology*, a name given by Augustino Scilla to a kind of dog-fish, not described by any author before his time, but accurately drawn by him in his book on petrifications, on occasion of its teeth: many species of the glossopetrae of the island of Malta, and other places, being plainly the same with the teeth in the jaws of this fish.

PESCHIERA, in *Geography*, a town of Italy, in the department of the Benaco, on the S. coast of the lake Garda. This small, but important fortress, was built by the Venetians in 1549. Its houses are few, and on the side of the lake it has an arsenal for some light galleys; 15 miles W. of Verona. N. lat. 45° 7'. E. long. 10° 42'.

PESCHISE, a town of Naples, in Capitanata; 11 miles N.W. of Vielle.

PESCIA, a town of Etruria, the see of a bishop; containing three parochial, and seven other churches, and five convents. It has a manufacture of oil, which is much esteemed; 10 miles S.W. of Pistoia.—Also, a town of Italy, in the Trevisan; seven miles S. of Treviso.

PESCINA, a town of Naples, in Abruzzo Ultra; five miles S.E. of Celano.

PESCINA *Pompeia*, a town of Naples, in the province of Bari; nine miles N. of Matera.

PESCINA *di Fratri*, a town of Naples, in Capitanata; eight miles W. of Vieste.

PESCO CASTRARO, a town of Naples, in Abruzzo Ultra; 11 miles N.E. of Aquila.

PESCO *Costanzo*, a town of Naples, in Abruzzo Citra; seven miles S.E. of Sulmona.

PESCO *Laurino*, a town of Naples, in Principato Citra; 18 miles N.W. of Policastro.

PESCO *Pagano*, a town of Naples, in the province of Otranto; 11 miles N.E. of Tarento.

PESCO *Verraro*, a town of Naples, in Principato Ultra; 12 miles from Benevento.

PESEQUEIRO, a small island in the Atlantic, near the coast of Portugal. N. lat. 37° 40'. W. long. 8° 52'.

PESHTWA, or PAISHWA, the hereditary title of the head of the Poona or western Mahrattas. The word has a meaning analogous to our first or prime minister; but has been retained by the persons who, for several generations, have hereditarily succeeded to the sovereignty. The history of the peshwas, according to the best authorities, is briefly this. About the year 1740, the peshwa and bukhi, minister and paymaster-general to the ram raja, acknowledged sovereign of the whole Mahratta empire, threw off their allegiance to the weak successor of the great Sevaji, and divided his extended empire between them. (See MAHRATTAS.) The bukhi was of the military tribe, out of which, in strictness of Hindoo law, all sovereigns must spring, and he assumed the title and authority of raja of Berar, and fixed his capital at Nagpour, where, with that title, his successors continue as sovereigns of the Berar, or eastern Mahratta itate. (See BERAR and NAGPOUR.) The peshwa was a Brahman, to which tribe sovereignty is positively prohibited by the laws of Menu. (See MENU.) And in obedience no Brahman hath ever become a king; for although the peshwa have, in fact, the power, he by a political fiction professes to be only peshwa to the reigning family at Sattara, where the descendant of Sevajee is kept a state pageant, whose patent and dress of investiture are still thought or feigned to be essential to the peshwa's authority, though that authority has been hereditary for several generations,

rations, each of which has kept the raja in honourable thraldom at his ancient capital.

At the time of the above-mentioned violent partition of the empire, Balaji, son of Viswanatha, was peshwa, he was succeeded by his son Bajy Rao, or Bajerow. He was succeeded by his son Balaji Baji Rao, who died in 1761, when his son and successor Mhadu Rao was but fifteen years old. Raganath Rao, the brother of the late peshwa, assumed the guardianship of the minor, and retained the power of a regent to an undue period, which involved the state in some troubles, and himself in imprisonment. He was, however, released by his nephew, who soon after died, in 1772, leaving the peshwaship to his brother Narayan Rao, and confiding him to the especial care of the uncle Raganath. It may be noted here, that the widow of Mhadu Rao burnt herself on the pile with her husband's corpse. Her name was Rama Bye. (See SATI). Raganath Rao, better known in the subsequent troubles of the western side of India by the name of Ragoba, pledged himself to the protection of the young peshwa Narayan Rao, whom he caused to be murdered the following year. His widow Ganga-bye was desirous of becoming a sati, or self-devoted victim to the flames, but she was found to be pregnant, and the Brahmans foretold a future peshwa; and the sacrifice was not permitted.

The Mahratta nation was indignant at the atrocious murder of the peshwa, and Ragoba was compelled to flee from its just resentment. After various attempts to obtrude himself on the nation, he was forced to yield, and was with his family imprisoned, and he died in confinement. He had two sons, Baji Rao, and Chimmaji Appah; and he had, before their birth, in despair of male issue, adopted a lad named Amrit Rao. These three were also kept in confinement.

The widow of the murdered Narayan Rao was delivered of a son, who was acknowledged as the rightful peshwa, and Nanna Furnaveese, as dowan, or minister; and during the minority, the latter great man ruled the empire. The posthumous son of the late Narayan Rao was named Mhadu Rao, and he was killed by a fall from his palace at Poona in 1795, leaving no son. Nanna Furnaveese, the sole minister, during a long minority, unwilling to resign his power, endeavoured to obtain another minority, by causing the widow of the deceased to adopt a child; but finding his political opponents determined on frustrating his views by an act of justice, he resolved on anticipating them in that point, and brought the family of Ragoba from their imprisonment, and placed the eldest, Baji Rao, in the peshwaship, to which he had the hereditary right. In consequent troubles and contentions of parties, he has been more than once deposed and forced to flee his capital, and latterly his country; to both of which he was restored by the interposition of a British force under general Wellesley, (now field marshal Wellington), and it seems likely, that under the present government, guaranteed and protected by the English, the Mahratta empire will enjoy a series of peaceful years, which it has hitherto never known. It may be noticed, that Amrit Rao has been suspected of fomenting the troubles that have of late years convulsed the Mahratta states. Disappointed in his views on the peshwaship for himself or his son, he has contrived to obtain British security for about 70,000*l.* sterling *per annum*, and under British protection has retired to Benares, the usual refuge with Hindoos of discontentment and disappointed ambition.

PESINGAN, in *Geography*, a town of Candahar; 90 miles S.E. of Candahar.

PESMES, a town of France, in the department of the

Upper Saone, and chief place of a canton, in the district of Gray; 10 miles S. of Gray. The town contains 1688, and the canton 15,188 inhabitants, on a territory of 282½ kilometres, in 37 communes. N. lat. 47° 17'. E. long. 5° 39'.

PESOLA, a lake of Naples, in Basilicata, at the foot of the Apennines.

PESQUERA, a town of Spain, in the province of Leon, near the Duero; 28 miles S.E. of Leon.

PESSAC, a town of France, in the department of the Gironde, and chief place of a canton, in the district of Bourdeaux. The place contains 1336, and the canton 7686 inhabitants, on a territory of 505 kilometres, in 8 communes.

PESSARY, an instrument, machine, or contrivance, invented for the purpose of restraining the uterus, and preventing it from descending into the vagina, of passing the external orifice, and appearing externally. This complaint, a descent of the uterus, is in a particular manner incident to women who have had several children, especially such as have had difficult labours, or who have suffered from laceration of the perinæum. It is not, however, entirely confined to such subjects. Some women who have never been pregnant, of feeble habit of body, or who have long suffered from fluor albus, are subjected to this accident; also washer-women, laundresses, and those whose occupations oblige them to be much on their feet, or to carry heavy loads.

Rest, cold astringent injections into the vagina, and bracing or strengthening medicines, may assist somewhat in the cure, but it is only to be completely effected by wearing a pessary. See *Bearing down of the WOMB*.

Pessaries are of various forms; but that in most frequent use, and which is generally found to answer the purpose, is the ring pessary; a circular piece of box, or other light wood, two, three, or four inches in diameter, and about a third of an inch in thickness, with a hole cut through its centre to allow a passage for the menstrual flux. Some prefer them of an oval shape, and made of cork, but they are not so easily retained in the passage. Others make use of a globular ball; but these, for obvious reasons, can only be used by women who have no husbands. Women sometimes conceive while wearing a ring pessary. In such cases, the pessary must be taken away when they are about five months advanced in pregnancy.

When a pessary is intended to be introduced, the woman should confine herself to her room for a day or two, and principally in a recumbent posture, and take an opening medicine, that the uterus may have an opportunity of retracting or returning to its natural situation, and may be reduced in bulk. These preliminary steps being taken, she must be laid on a bed, on her left side, her head only raised on a pillow, her knees drawn up to her belly. The surgeon will then open the labia of the pudenda with the forefinger of his left hand, which he will pass through the external orifice, to enlarge it a little, then taking a pessary, of a proper size, anointed with lard, in his right hand, he will introduce it edgeways. When it is completely within the vagina, he will turn it, that it may lie horizontally, one face of it opposite to the os uteri, the other looking downward to the os externum.

The pessary should be so large as to pass the os externum with difficulty, otherwise it will fall out again when the woman is on her legs. The hole in the centre should be large, that if the os uteri should enter it, it may not be strangled, which might occasion pain, and perhaps some serious mischief.

PESSOMANTIA, Πισσομανθία, in *Antiquity*, the same with cleromancy.

PEST, or PESTH, in *Geography*, a royal and free town of Hungary, on the E. side of the Danube, opposite to Buda. See BUDA.

PESTDON, a town of Prussia, in Pomerelia; 10 miles S. of Marienburg.

PESTERABLE, in our *Old Writers*, an epithet for such wares as *pester*, or take up much room in a ship. Stat. 32 Hen. VIII. cap. 14.

PEST-HOUSE, a lazaretto, or infirmary, where goods, persons, &c. infected, or suspected to be infected with some contagious disease, are disposed, and provided for. See LAZARETTO.

PESTI, in *Geography*, a town of Naples, in Principato Citra, situated near the ruins of the ancient *Pestum*; which see.

PESTICCIA, a town of Naples, in Basilicata; 9 miles N. of Turfi.

PESTILENCE, formed from *pestis*, which signifies the same, in *Medicine*, an epidemical, malignant, and contagious disease, usually mortal, popularly known under the name of *plague*; which see.

PESTILENCE-Wort, in *Botany*. See TUSSILAGO.

PESTILENTIAL CARBUNCLE. See CARBUNCLE.

PESTILENTIAL DISEASE. See DISEASE.

PESTILENTIAL Fevers, among *Physicians*, are such as do not only afflict the patient with a vehement heat, but also with some malignant and venomous quality, and in some approach to the nature of the plague.

PESTIVIEN, in *Geography*, a town of France, in the department of the North coast; 9 miles S.S.W. of Guingamp.

PESTOVSKOI, a town of Russia, in the government of Viatka, on the Suran; 48 miles N.N.E. of Slobodskoi.

PESU, or SIU, a city of China, of the second rank, in Kiang-nan, on the river Hoang. N. lat. 34° 10'. E. long. 117°.

PESVER, a town of Persia, in the province of Irac; 60 miles W. of Kermansha.

PESUNSCUT, a river of America, in Cumberland county, Maine, which pursuing a winding course of 20 miles, carries off the surplus water of Sebacock pond into Portland bay.

PETACCIATA, a town of Naples, in Abruzzo Citra; 22 miles S.E. of Civita Borella.

PETAGUIL, a territory of South America, in Brazil; bounded N. by Dale, E. by the South Atlantic ocean, S. by the captainship of Rio Grande, and W. by Tupuy: it contains mines of silver.

PETAJA, a town of Sweden, in Tavastland; 22 miles N. of Jamio.

PETALIONS, a cluster of small islands in the Grecian archipelago, near the S.W. coast of the island of Negropont. N. lat. 37° 59'. E. long. 24° 16'.

PETALISM, PETALISMUS, πάλισμος, in *Antiquity*, a kind of exile or banishment, for the term of five years.

The petalism at Syracuse was nearly the same thing as the ostracism at Athens, except that the latter was for ten years, and the former only for five.

The petalism was performed by the people's writing the name of the person condemned, on a leaf; whence the term from πάλιον, leaf.

PETALODES, πάλωδες, a name given to urine, when it seems to have little leaves, flakes, or scales in it.

PETALOMA, in *Botany*, a new West Indian genus,

established by Swartz, and named by him, from *πέταλον*, a *petal*, and *λίμνος*, a *border*; because the petals are inserted into the margin of the calyx, between its teeth. Swartz Prodr. 73. Ind. Occ. v. 2. 831. Schreb. 802. Willd. Sp. Pl. v. 2. 542. Mart. Mill. Dict. v. 3. (Mouriria; Juss. 320. Lamarck Illustr. t. 360. Mouriri; Aubl. Guian. v. 1. 452.)—Class and order, *Decandria Monogynia*. Nat. Ord. *Calycanthemæ*, Linn. *Onagrea*, Juss.

Gen. Ch. Cal. Perianth superior, of one leaf, cup-shaped, permanent, with five acute, equal, slightly spreading teeth. Cor. Petals five, oblong, spreading, their claws inserted between the teeth of the calyx, deciduous. Stam. Filaments ten, inserted into the rim of the calyx, longer than the corolla; anthers oblong, incumbent, opening by two pores at one end. Pijl. Germen inferior, ovate; style elongated, awl-shaped; stigma simple, acute. Peric. Berry globose, fleshy, crowned by the calyx, of one cell. Seeds from one to four, angular on one side, convex on the other.

Eff. Ch. Calyx pitcher-shaped, five-toothed. Petals five, inserted between the teeth of the calyx. Stamens inserted into its border. Berry of one cell.

1. *P. myrtilloides*. Sw. Ind. Occ. 833. Willd. n. 1. (*Myrti folio arbor, cortice argenteo, foliis oblongis ad basin lateribus, acuminatis, inodoris, ex adverso fitis, flore pentapetaloidae pallide albicante*; Sloane Jam. v. 2. 78. t. 187. f. 3.)—Stalks solitary, single-flowered. Leaves nearly sessile, ovate, taper-pointed, oblique at the base.—Native of Hispaniola and Jamaica, in low woods; being known in the last-mentioned island by the name of Silver wood. Swartz describes it as a *shrub*, two or three feet high; Sloane says the *trunk* is twenty feet in height, straight and undivided. Both agree that the *bark* is spotted with white, whence arose the English name. The *leaves* are opposite, entire, thin, smooth, and inodorous, one and a half or two inches long. *Flowers* axillary, solitary, rarely opposite, on shortish stalks, white, smaller than a currant blossom, but with long projecting *stamens* and *style*. *Berry* ovate, crowned with the *calyx*, black and shining when ripe, with seeds more than one *seed*. The aspect of the whole plant is like some species of myrtle, but it wants the strong taste and smell of that genus, and the structure of the *flowers* is totally different.

2. *P. Mouriri*. Sw. Ind. Occ. 835. Willd. n. 2. (*Mouriri guianensis*; Aubl. Guian. v. 1. 453. t. 180.)—Stalks clustered. Leaves stalked, broad-ovate, pointed. Berries with four seeds—Native of woods in Guiana, near the river of Sinemari, where Aublet found it flowering in November, and bearing ripe fruit in January. The *trunk* of this tree is thirty or forty feet high, and eighteen inches in diameter, bearing at the top numerous *branches*, spreading in every direction. The *bark* is grey; the *wood* whitish, hard and close-grained. *Leaves* longer, and much broader than those of the foregoing, as well as of a firmer texture, paler underneath, but smooth and shining on both sides. *Footstalks* short and thick. *Flower-stalks* axillary, clustered, and somewhat umbellate, with small, opposite, acute *bractees*. *Flowers* yellow. *Anthers* with a sort of spur at their base. *Berry* yellow, minutely dotted with red, containing four *seeds*. Nothing is recorded of the qualities or use of this tree, but the inhabitants of the country where it grows name it *Mouririchira*.

PETALOSTEMUM, so called by Michaux, from *πέταλον*, a *petal*, and *σημαν*, a *stamen*, on account of the union of those two parts of the flower into a tube. Michaux Boreal-Amér. v. 2. 48. t. 37. See DALEA.

PETALUM, the petal, or leaf of the flower, *πέταλον* of the

the Greeks, is either simple, as in the Primrose and Jasmine, or compound, as in the Rose. The two former are termed monopetalous flowers, the latter polypetalous. Linnæus observes, that when the nectary is a distinct organ from the petals, flowers so constructed are to be suspected as poisonous. Both together constitute the COROLLA; see that article, as well as NECTARIUM, and FECUNDATION of Plants.

PETAMINARIUS, in *Antiquity*, a name given to certain persons who performed extraordinary feats of activity; took perilous leaps, vaults, &c.

The word is formed from the Greek, *πέταμι, volo, I fly*. Some authors write it *petiminarius*: and derive it from *petimen*, which, according to Servius, signifies the hunch of a camel: alluding to the manner in which these operators bend the body, in exhibiting postures, &c.

PETAPA, in *Geography*, a town of Mexico, in the province of Culiacan, on a river of its own name; 120 miles N.W. of Culiacan. N. lat. 25° 30'. E. long. 104° 34'.

PETAPOLLY, a town of Hindoostan, in the circar of Rajamundry; 26 miles N.E. of Rajamundry.

PETARD, in *War*, a kind of engine of metal, somewhat in shape of a high crowned hat, or truncated cone; serving to break down gates, barricades, draw-bridges, or the like works which are intended to be surpris'd.

The petard may be considered as a piece of ordnance, very short, narrow at the breech, and wide at the muzzle, made of copper mixed with a little brass; or of lead with tin; usually about 8.5 inches within at the bottom; the diameter at the beginning of the round part is six, and distant from the lower base nine inches: the circular part is described from the point where the perpendicular to the sides meets the middle line or axis; the thickness of metal is 1.6 inches; there is a brim at the bottom, that projects the metal by two inches, and is one inch thick, in which are six holes of half an inch diameter, which serve for screws to fasten the petard on a board in a firm manner; there is a cavity within at the bottom, half an inch deep, and as much in height, to fix a board, in order to keep the charge in the petard before it is fixed to the board or plank. There are likewise two handles, of about three inches from the flat ring, five inches long,  $\frac{7}{8}$  thick, and 1.8 from the outside of the metal. Lastly, a hole of an inch diameter is made either at the top, or on the side, to screw in an iron fuse, by which the powder is fired, which fuse is filled with a slow composition, in order that when it is lighted, the petardier may have time to retire out of danger. See the section of a petard in *Plate I. Gunnery, fig. 4.*

In Grose's "Military Antiquities," vol. i. we have a plate, with figures, representing the petard, and the boards, &c. to which it is fixed, and also two different methods of applying it.

Petards are made of various dimensions: but the biggest should not weigh above seventy pounds when loaded and fixed to its plank, and the least not less than forty-five or fifty. The common and best way of loading the petard is to fill it gradually with powder, and between every layer of two or three inches thick, to put a wooden mould into the petard, which should be beat upon with a mallet, so as to press the powder as close together as possible, without bruising the grains; and when it is quite full, the board is put upon the powder, and over this a cloth with rosin, and bound round the brim with packthread, to keep the charge and board together till the petard is screwed on the plank or board, called the "madrer;" then the part that exceeds the brim is cut off, and the other being pressed by the brim, prevents any air from coming to the powder. The board

to which the petard is fixed has two iron bands on the back, placed cross-ways, and a hook to hang it up against the gate or door, by means of a screw, when it is to be used. Some moisten the powder with spirits of wine, and dry it in the sun, in order to make it stronger, and then sprinkle every layer of powder of two inches in thickness with mercury, upon which they lay powder again, and press it down, sprinkling it with mercury, till the petard is filled.

Its use is in a clandestine attack, to break down gates, bridges, barriers, &c. to which it is hung: which it does by means of the wooden plank. It has been also used in countermines, to break through the enemies galleries, and give vent to their mines; but in later years the use of petards has been discontinued.

Petards are sometimes also made of wood, bound round with iron hoops.

The invention of petards is ascribed to the French Huguenots, in the year 1579. Their most signal exploit was the taking of the city of Cahors by means of it, as we are told by d'Aubigne. In December 1641, Arundel castle was taken by the parliamentary forces, under Sir William Waller and Col. Browne, who coming unexpectedly, and finding the castle-gate shut, blew it open with a petard.

PETARDIER, in the *Military Art*, is he who loads, fixes, and fires the petard.

PETASITES, in *Botany*, *πέτασις*: of the Greeks, the Butter-bur, owes that name to its large round leaf, resembling a very broad hat or umbrella, *πέτασος*. See TUSSELLAGO.

PETASUS, among the Romans, a covering for the head, not unlike our hats; it had a broad brim, and was used in journeys, to save the face from being sun-burnt.

The pileus differed from the petasus, as having no brim.

The petasus is observed upon the head of ancient figures of Mercury; who wore it in the quality of the god of travellers and merchants.

PETATLAN, in *Geography*, a town of Mexico, in the province of Culiacan, on a river of the same name, which runs into the Pacific ocean, N. lat. 25° 30'. The town is distant 120 miles N.W. from Culiacan. N. lat. 25° 30'. W. long. 104° 34'.—Also, a town of Mexico, in the province of Mechoacan; 70 miles S.E. of Zacatula. N. lat. 18°. W. long. 102° 6'.

PETAWONTAKAS, an Indian nation of America, formerly in alliance with the Hurons.

PE-TA-YANG, a small island in the Chinese sea. N. lat. 26° 2'. E. long. 119° 49'.

PE-TCHE-LI, or PE-CHE-LEE, called also *Tcheli*, or *Li-pa-fou*, the principal province of China, which approaches to the form of a right-angled triangle, and is bounded on the N. by the great wall and part of Tartary, on the E. by the sea of Corea, on the S. by the provinces of Chang-tong, and Ho-nan, and towards the W. by the mountains of Chan-si. It contains nine cities of the first class, with their respective jurisdictions, which comprehend a great number of other cities, less considerable, but all surrounded with walls and ditches. Cities of the first rank are distinguished by the appellation *fou*; those of the second rank by *tcheou*; and those of the third rank by *kien*. The capital of this province is Pekin; which see. Pe-tche-li is very much a level country, and has few mountains; and therefore it allows of the use of a singular kind of carriage, with one wheel, and constructed so that there is room in the middle for only one person, who sits as if he were on horseback; the driver pushes behind, and by means of wooden levers,

levers, makes the carriage, which is a sort of chariot, advance with safety and expedition. The soil of this province is sandy, and produces very little rice; but all other kinds of grain are abundant, as well as most of the fruit-trees which we have in Europe. The rivers supply abundance of fish, and the mountains have mines of coal. The temperature does not seem to agree with its latitude. Although it extends no farther than to 42° N. lat., yet all the rivers are frozen, during four months in the year, from the middle of November to the middle of March, to such a degree, that horses and waggons, with the heaviest load, may safely pass over them. It is remarked, as a singular circumstance, that the whole body of ice is formed in one day, and that several days are requisite to thaw only the surface. The rainy season occurs towards the end of July, and the beginning of August: there is little rain at any other time, but the night dew supplies the want of it. It is observed by Grofier that the people of this province have not the same aptitude for acquiring literature and science, as those who inhabit the southern provinces of the empire; but they are more robust and warlike, and better fitted for enduring the hardships and fatigues of war. The same observation applies to the Chinese of all the other northern countries. This province is distinguished from all others, by being, as it were, the depot of the richest productions of the whole empire. According to the statement of sir George Staunton, in the appendix to the second volume of the "Embassy to China," this province contains 58,949 square miles, or 37,727,360 acres, and 38,000,000 of people. The revenue which it remits into the imperial treasury at Pekin, amounts to 3,036,000 takels, or ounces of silver, viz. 2,520,000 land, 437,000 salt, and 79,000 other taxes.

PETCHORA, or PESHORA, a river of Russia, called also *Bolskaia*, or great *Petchora*, by way of distinction from the *Vishera*, which the Siyanes call *Petsloyra*, whence originates the name, takes its rise on the western side of the Ural mountains, in the government of Vologda, follows a N.W. course, and falls into the Frozen ocean, in the government of Archangel, after dividing into several powerful arms. It now flows through a low, foresty, and almost uninhabited country. At first, when Siberia was conquered, the way thither was generally by the *Petchora*. Those who visited that country, sailed up the *Duina*, the *Vichegda*, and the *Vim*, then went a short space by land to the *Petchora*, then up that river, and by land over the Ural mountains to the *Sofva*; hence into the *Tavda*, the *Tobol*, the *Irtysk*, the *Oby*, the *Ket*, and from the *Ket* into the *Yenisey*, &c.

PETECHIÆ, in *Medicine*, otherwise called *Peticula*, *Puncticula*, *Senticula*, &c., are small purple, reddish, livid, or blackish spots upon the skin, occasioned by the effusion of a minute portion of blood under the cuticle, or scarf-skin. When these spots are very minute, like small points, they are called *stigmata*; when they are large, and spread into broad irregular patches, like the effusions occasioned by a bruise, they are called *ecchymoses* and *ecchymomata*; and when they occur in stripes, like the effects of the strokes of a whip, they are denominated *vibices*.

Petechiæ occur under various circumstances, but are most frequently seen in severe fevers, of a dangerous and malignant character, especially in typhus, when it exists in gaols, hospitals, and the ill-ventilated habitations of the poor; they are occasionally seen intermixed with the pustules of small-pox, especially of the confluent kind, and with the worst species of scarlet fever. Whence they have generally been accounted indications of great danger, and have been considered as signs of the general putrefecency of the circu-

lating fluids, and as demanding the exhibition of the most powerful stimulants and antiseptics, whenever they appear.

On the contrary, however, petechiæ of the largest dimensions, and even extensive ecchymoses and vibices, together with actual hæmorrhages, are occasionally seen, unaccompanied by fever, and sometimes with but little derangement of the health. Whence authors have written of "Petechiæ sine febre" as a distinct disease, which has been also called PURPURA, HÆMORRUIÆA *Petechialis*, &c. See the former of these words, where this chronic petechial disease will be found described at length.

It is but too obvious, that the nature of these petechial spots is not yet sufficiently understood: but some recent light has been thrown upon the subject by medical observers, which bids fair to lead both to a more satisfactory theory and practice in respect to them, as will be stated in the article just referred to.

PETECHIAL FEVERS are those varieties of typhus, in which petechiæ occur in considerable numbers, constituting one of the most prominent features of the disease. See TYPHUS and FEVER.

PETELMA, in the *Turkish Military Orders*, is the procurator-general of the effects of the Janizaries. When any one dies under the protection of this body, he seals up their houses, to secure the tenth part of their effects; which is due to the Janizaries.

PETER, SIMON, in *Scripture Biography*, whose surname Cephas, or Petrus, Peter, signifies a stone or rock, was born at Bethsaida, upon the banks of the sea of Galilee; and his occupation was that of a fisherman upon this lake, as was also, in all probability, that of his father Jonas, Jonah, or John. He had a brother, whose name was Andrew, supposed by some writers to have been older, but more generally, younger than himself. Andrew, as we learn from the gospel of St. John (ch. i. 35—42.), first introduced his brother, Peter, to an acquaintance with our Saviour; and as he had received Jesus as the Messiah, Peter readily concurred in the same belief and profession. From the testimony of John, by whom they had been probably baptized, and from personal conversation with our blessed Lord, they were convinced that he was the promised Messiah; and it is likely that from this time they had frequent intercourse with him, and were witnesses of some of the miracles which were wrought by him, and particularly of that performed at Cana in Galilee. (John, ii. 1. 2.) The call of Andrew and Peter to a stated attendance on Jesus is recorded by three evangelists; after which event they became his intimate companions, and when he completed the number of his apostles, they were included among them. At the time of Simon Peter's being called to attend upon our Lord, he was married, and upon occasion of that alliance, he seems to have removed from Bethsaida to Capernaum, where his wife's family resided. It appears also, that when our Lord "left Nazareth, and came and dwelled at Capernaum" (see Matt. iv. 13.), he took up his occasional residence in Peter's house, and hither the people resorted to him in the evening, as we read in Luke, iv. 40. Matt. viii. 16. Mark, i. 32. 34. See also Matt. xvii. 24—27. In the evangelical history of this apostle, the distinguishing features of Peter's character are very signally portrayed; and it redounds in no small degree to the credibility of the historians, that they have blended, without disguise, several traces of his precipitance and presumption with the honourable testimony which their narration of facts affords to the sincerity of his attachment to Christ, and the fervour of his zeal in the cause of his blessed master. Of his

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his modesty and humility we have a memorable instance in the account which St. John has given of our Saviour's washing the feet of his disciples (ch. xiii. 1—10.); and the ardour of his spirit is strikingly evinced in his conduct towards the servant of the high priest, whom he smote with his sword, and whose right ear he cut off, when the Jewish officers were about to apprehend our Lord. (John, xviii. 10, 11. Matt. xxvi. 51—54. Mark, xiv. 46, 47. Luke, xxii. 50, 51.) In the subsequent scene, however, his resolution, notwithstanding the vehemence with which he had avowed his invincible attachment to his master, and the caution which he had received, unhappily failed him. Although he followed his master afar off unto the high priest's palace, an anxious witness of the event, when the rest of the disciples forsook him and fled, he thrice disowned him, peremptorily denying that he was one of his disciples, or had any knowledge of him. This dereliction and denial of Christ, in circumstances of peculiar trial, soon after humbled and grieved him, and he wept bitterly. It does not appear, that Peter followed our Lord any farther, or that he at all attended the crucifixion. It is likely, that he was too deeply affected with sorrow and shame to appear in public, and that he chose retirement, as most suitable to his present temper and circumstances. In the sequel of his history, our blessed Lord manifested, in the most amiable and impressive manner, the singular sympathy and condescending benevolence of his temper; for he singles out Peter by name as one of the disciples to whom the report of his resurrection was to be announced; and on the same day on which he arose from the dead, he appeared to this apostle, though the circumstances of this appearance are no where related. (See Luke, xxiv. 33, 34. 1 Cor. xv. 4, 5.) Hence it has been observed, to the honour of our Lord's philanthropy and compassion, that as Mary Magdalene was the first woman, so Peter was the first man to whom Jesus shewed himself after he was risen from the dead. On another occasion, recorded in the 21st chapter of St. John's gospel, our Lord affords Peter an opportunity of making a three-fold profession of love for him; and notwithstanding his late unsteadiness, he encouraged this disciple to hope, that in his future conduct he would set an example of resolution and fortitude under great difficulties, and at length glorify God by his death, in the service to which he had been appointed.

Dr. Lardner has selected from the four evangelists several particular instances, which serve to indicate the peculiar distinction of St. Peter, and that redound in no small degree to his honour. He concludes this detail with observing, that as our sacred historians were not envious, and that Peter was not assuming and arrogant among his brethren, so neither were they fond and partial. The several advantages and virtues of Peter are recorded by some only; but his fault in denying Christ, when under persecution, is related by all.

Soon after our Lord's ascension, Peter, who seems to have presided in the college of the apostles, proposed a successor to Judas; and he seems to have had a primacy of order among the apostles, being named first when several of them are mentioned; although there is not the least foundation, either in the gospels, or the Acts, for ascribing to Peter any jurisdiction over his brethren. On the day of the ensuing pentecost, Peter distinguished himself by a discourse delivered to a very numerous audience, in which he asserted the resurrection of Christ, with such commanding energy, that about 3000 were converted and baptized. (Acts, ii. 14—47.) On another occasion he accompanied a miracle, wrought by himself and John, with an address to the people, by which many were awakened and convinced; and in a short time after this, the number of believers at Jerusalem

was about 5000. (Acts, iii. and iv. 4.) But the Jewish priests and rulers were much offended; and whilst Peter and John were speaking to the people, the officers, whom they had commissioned for this purpose, laid hold on them and put them in prison till the next day, when they were examined, and at length dismissed, with a strict charge, enforced by a severe menace, not to preach any more in the name of Jesus.

Peter and John, after a visit to Samaria, returned to Jerusalem; and in their way thither preached the gospel in many villages of the Samaritans. (Acts, viii. 1—25.) During the tranquil state of Judea, Galilee and Samaria, which commenced in the year 40, and continued a year or more, Peter passed through all parts of the country, availing himself of the opportunity that was thus afforded him of disseminating the knowledge of Christianity, and confirming the faith of those who had embraced it. Whilst on this peregrination he remained at Joppa, where he restored to life a Christian woman of excellent character, named Tabitha, and where a message was sent to him from Cornelius, an inhabitant of Cæsarea, by the sea-side, which was a city where the Roman governor resided, requesting a visit from him, for the purpose of farther instruction on the subject of religion. At Cæsarea his preaching was attended with signal success; and thus the door of faith, or the kingdom of heaven, or of the Messiah, was opened to Gentiles, and they were received into the church of God. Upon his return to Jerusalem, he gave an account to the Jewish Christians of the event of his mission, and satisfied them with regard to the propriety of his conduct in preaching the gospel to the uncircumcised Gentiles, and receiving them into communion by baptism without circumcision according to the law of Moses. From this time the gospel was freely preached to Gentiles as well as Jews, and the success corresponded to the zeal of those who were engaged in this interesting cause. Soon after the conversion of Cornelius the tranquillity of the churches was interrupted; nevertheless Peter, and the other apostles, still continued in Judea; and as far as circumstances allowed, employed themselves in confirming the believers and making additions to their number. Towards the end of his reign, Herod Agrippa became an open persecutor of the believers; and not only put to death James the brother of John, but committed Peter to prison. This was at the Easter, or passover, of the year 44. After a miraculous deliverance from confinement, he lived privately at Jerusalem, till the death of Herod Agrippa, which happened before the end of that year. Some have thought that Peter now went to Antioch, or Rome; but Dr. Lardner thinks that there is no good evidence of either of these opinions. When the council of Jerusalem was assembled in the year 49 or 50, Peter was present, and in the debate, which had occasioned this assembly, he clearly declared his opinion, that *the yoke of the law should not be laid upon the neck of the disciples* from among the Gentiles. Some short time after this council, Peter was at Antioch; where at first he conversed freely with the Gentile converts; but when some Jewish believers, who were zealous for the law, came thither from Judea, *he separated himself, fearing them of the circumcision*; thus acting in a manner contrary to his own judgment and declared opinion, through fear of the displeasure of others. St. Paul reformed his conduct, as chargeable with dissimulation or hypocrisy; and convinced him that he was blameable. It was at this time, *viz.* in the year 50, that Peter first went from Judea into Gentile countries, never more deviating into that duplicity, for which he had been justly censured, but maintaining a firm and consistent conduct. This is the last time that Peter is expressly mentioned in the New Testament,

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ment, except in his own epistles, and in 1 Cor. i. 12. and ch. iii. 22.

We have no where any very distinct account of this apostle's travels. From Antioch he might return to Judea. Epiphanius says, that he was often in the countries of Pontus and Bithynia; and Origen, according to Eusebius, expressly declares, that "Peter is supposed to have preached to the Jews of the dispersion in Pontus, Galatia, Bithynia, Cappadocia, and Asia: who, at length, coming to Rome, was crucified with his head downwards, himself having desired it might be in that manner." As to the time of Peter's coming to Rome, no ancient writer is more regarded by learned moderns than Lactantius, or the author of the book of the Deaths of Persecutors, whoever he be; and this author says, that Peter came thither in the time of Nero. But allowing that he came to Rome in the reign of Nero which began in the year of Christ 54, the precise time is not ascertained. To Dr. Lardner it appears very probable, that St. Peter did not come to Rome before the year of Christ 63 or 64, nor till after St. Paul's departure thence, at the end of his two years' imprisonment in that city: and this author, who is no less industrious in his researches than impartial in his reports, supposes, that he obtained the crown of martyrdom in the year 64 or 65; consequently St. Peter could not have resided very long at Rome before his death. The learned Cave is of opinion that the apostle died a martyr at Rome in the year of Christ 64, at the beginning of Nero's persecution. Jerom concludes his article of St. Peter, with saying, "He was buried at Rome in the Vatican, near the triumphal way, and is in veneration all over the world." Caius also, about the year 212, speaks of the tombs of the two apostles, Peter and Paul, at Rome; and Chrysofom supposes St. Peter to have been buried in that city. Some have asserted, but without sufficient authority, that he travelled into Persia or Parthia. Several other circumstances are mentioned with regard to St. Peter, which are equally destitute of foundation: such as his episcopate at Antioch, and his having been twenty-five years bishop of Rome, which is altogether inconsistent with his history in the Acts. Several ancient writers mention his having children, and the martyrdom of his wife about the same time with himself. Some have also said that he escaped from prison, and endeavoured to save his life by flight; but that in passing through the gates of the city, he saw Christ entering into it; and that in consequence of this interview, and a conversation that occurred, he turned back, and being soon after taken up, he was crucified. But this account seems to have been fabulous. As to the manner of his crucifixion, we have already given Origen's account of it. St. Jerom also says "that he was crucified by order of Nero, and so crowned with martyrdom, his head downward, and his feet lifted up, saying, he was unworthy to be crucified as his master was." Chrysofom also several times speaks of Peter's being crucified with his head downwards. It seems to me, says Dr. Lardner, that Peter might be crucified in that manner, and that it might be owing to the spite and malice of those who put him to death. The saying, that it was at his own desire, may have been at first only the oratorical flight of some man of more wit than judgment. But the thought was pleasing, and has therefore been followed by many.

We may add, that some learned men have denied that Peter ever was at Rome; among them are Scaliger, Salmasius, and Frederick Spanheim. Mr. Bower has adopted this opinion. However, many learned men, among the Protestants, as well as Romaniſts, whose impartiality has never been questioned, have believed

and argued that Peter was at Rome, and suffered martyrdom there. To this class we may refer Cave, Pearson, Le Clerc, Basnage, Barratier, and Lardner. Among the ancient writers, who testify to the same fact, we may enumerate Clement of Rome, in his epistle to the Corinthians, written before the year of Christ 70, or, as some think, about the year 96, Ignatius about 108, Dionysius about 170, Irenæus about 178, Clement of Alexandria about 194, Tertullian about 200, Caius about 212, Origen about 230, Cyprian about 248, Lactantius about 306, Eusebius, Athanasius, Ephrem the Syrian about 370, Epiphanius, Jerom, Chrysofom, Sulpicius Severus about 401, Prudentius about 405, Orosius about 416, Theodoret about 423, Augustine, &c. &c. The preaching of Peter, or of Peter and Paul, quoted by several ancient writers, though not as a book of authority, composed about the middle of the second century, or sooner, makes mention of Peter's being at Rome.

For an account of the epistles of St. Peter, we refer to the articles EPISTLE and CANON, adding here some particulars respecting their genuineness. The first of these two epistles has been always received by Catholic Christians as authentic and genuine. This epistle seems to be referred to by Clement of Rome; is plainly referred to several times by Polycarp; also referred to by the martyrs at Lyons: it was received by Theophilus, bishop of Antioch, and quoted by Papias, Irenæus, Clement of Alexandria, and Tertullian. But the second epistle, mentioned as doubtful by Jerom and Origen, is not cited by Papias, Irenæus, Tertullian, or Cyprian. However both these epistles were generally received in the 4th, and following centuries, by all Christians, except the Syrians. For they were received by Athanasius, Cyril of Jerusalem, the council of Laodicea, Epiphanius, Jerom, Ruffin, Augustine, and others. Such are the testimonies of ancient writers concerning these two epistles; and if we consult the epistles themselves, and endeavour to form a judgment by internal evidence, it will appear very probable that both belong to the same author. Allowing the first to be St. Peter's, the following arguments may be alleged in favour of the other. It bears in the inscription the name of the same apostle. From chap. i. 16, 17, 18, it appears, that the writer was one of the disciples who were with Jesus in the mount at the time of our Lord's transfiguration, which leads us to St. Peter, who was there.

In ch. iii. 1. there is an express reference to the former epistle, which has been always acknowledged to be St. Peter's. (See also ch. i. 12—15.) In ch. iii. 15, 16, the writer calls Paul brother, and otherwise so speaks of him and his epistles, as must necessarily be reckoned most suitable to an apostle. The writer therefore is the apostle Peter, whose name the epistle bears in the inscription. The opinion advanced by Grotius, that this second epistle was written by Simeon, bishop of Jerusalem, after James, the Lord's brother, is destitute of all authority from antiquity, and is inconsistent with the whole tenour of the epistle itself, or at least with many things that occur in it. Jerom, already cited, says that Peter wrote two epistles, called Catholic; the second of which was by many denied to be his, because of its differing in style from the former. But Basnage says, he is not able to discern such difference of style in the two epistles. However Dr. Sherlock, bishop of London, in his "Dissertation concerning the Authority of the Second Epistle of St. Peter," observes, that the first and third of the three chapters, into which this epistle is now divided, agree in style with the first epistle. The only difference is in the second chapter, the style of which is no more like to  
that

that of the other two than it is to that of the first epistle. The occasion of this difference seems to be, that in the second chapter there is a description of the false prophets and teachers, who infested the church, and perverted the doctrines of the gospel. Some ancient Jewish writer had left behind him a description of the false prophets of his own, or perhaps earlier times; which description is applied both by St. Peter and St. Jude to the false teachers of their own times. His lordship adds, St. Jerom supposed, and others have followed his opinion, that St. Peter made use of different interpreters, to express his sense in his two epistles. But if that had been the case, the difference of style would have appeared in the whole, and not in one part of it only; which is the present case: and he sees no reason for thinking, that St. Peter did not write both his epistles himself. Some, however, may think, that this difference of style arises from the subject treated of in the second chapter. Dr. Lardner concludes, upon the whole, that the two epistles, generally ascribed to the apostle Peter, were indeed his. These epistles were sent to all Christians in general, both Jews and Gentiles, living in Pontus, Galatia, Cappadocia, Asia and Bithynia, but chiefly those of Gentile stock and original: who were for the most part the converts of the apostle Paul.

There has been a considerable difference of opinion concerning the place where these epistles were written: and more especially about the place called Babylon, at the close of the first epistle. Some have thought this to have been Babylon in Assyria, or Babylon in Egypt, and others interpreting the passage figuratively, suppose that it denoted Jerusalem or Rome. It is the opinion of Grotius, Whitby, Valesius, and all the learned writers of the Roman communion in general, that by Babylon St. Peter figuratively means Rome; and this opinion is the more probable, as it is uncertain whether St. Peter ever was at Babylon in Chaldæa, or in Egypt, and altogether improbable, that he made any considerable stay there, if he ever visited either of these places. As to the time of writing these epistles, Dr. Lardner thinks it to have been the year 63 or 64, or at the latest 65. Lardner's Works, vol. vi.

PETER, in *Biography*, a saint in the Roman calendar, and one of the most illustrious prelates of his time, was educated, and probably born, at Alexandria. Here he acquired a high character for his proficiency in sacred literature, and also for his exemplary manners and distinguished piety. On the death of Theonas, in the year 300, he was chosen his successor, and according to Eusebius he obtained great honour during his episcopate, which lasted twelve years. He was an excellent teacher of the Christian doctrine: an ornament to the episcopal character, both for the holiness of his life, and his laborious application in studying and explaining the sacred scriptures. He governed the church three years before the persecution. The rest of his time he passed in a more strict and mortified course of life, but without neglecting the common good of the churches. It is probable, that during a considerable part of that distressing period he resided in some private place, unknown to the instruments of persecution, where, however, the Christians had access to him, and received his advice and instructions. After this, according to Eusebius, he was, without any crime, of any kind, being laid to his charge, on a sudden, for no other reason but the will of Maximin, taken into custody, and beheaded. This martyrdom took place in the year 311. He is the reputed author of "A Book of Penance," of which thirteen canons are inserted, in Greek and Latin, in the first volume of the Collect. Concil. Some fragments of another treatise attributed to him "Concerning the Divi-

nity," are to be met with in the third and fourth volumes of the same collection. Gen. Biog.

PETER, surnamed *Chryfologus*, a saint in the Roman calendar, and a celebrated prelate in the fifth century, was of noble extraction, and born at Imola, anciently known by the name of Forum Corneli. He was educated by Cornelius, bishop of his native city, who admitted him into holy orders, and appointed him to the office of his deacon, which he retained many years. He was elected bishop of Ravenna in the year 433, and died before 451. His eloquence was greatly admired, whence he had the surname of Chryfologus, or the golden preacher. What remains of his productions consist chiefly of "Sermons," or "Homilies," containing short explanations of portions of the sacred scriptures, accompanied with moral reflections. They are said to be drawn up in a perspicuous and pleasing style; and are distinguished by a happy union of conciseness and elegance. They were collected 250 years after his death, by Felix, one of his successors in the see of Ravenna, and were first printed at Cologne, in the year 1541. Afterwards they underwent repeated impressions at the same place, Antwerp, Paris, Lyons, Venice, and Bologna, and were inserted in the seventh volume of the *Bibl. Patr.* Six others, on the Lord's Prayer, are given by Father A' Achery, in his "Spicilegium." There is also still extant "A Letter to Eutyches the Archimandrite," from our prelate, in which he declares against the sentiments of that monk, and expresses his approbation of the conduct of the patriarch Flavianus. Moreri.

PETER, surnamed the *Cruel*, king of Castile, was the only legitimate son left by Alphonso XI., whom at the age of sixteen he succeeded in 1350. He was at first under the influence of his mother and Don Juan de Albuquerque, her favourite; and to the queen dowager is to be attributed the treacherous execution of Leonora de Guzman, the late king's mistress, by whom he had three sons. Peter, at an early period, displayed a disposition equally perfidious and sanguinary. He caused the objects of his displeasure to be murdered without trial, and scrupled no means to get into his power those whom he feared or suspected. In 1352 Albuquerque, with a view of confirming his own authority, introduced the young king to the Maria de Padilla, of whom he became so much enamoured, that her influence over him was attributed even to witchcraft. At the same time a marriage was negotiating for him with Blanca, daughter of the duke of Bourbon. It took place in 1353, but he remained with his bride only three days, and then returned to his mistress. Soon after he put his wife in prison, and then divorced her, in order that he might marry Joanna de Castro, whom he also abandoned, after a very short cohabitation. Donna Blanca was sent to Toledo, the citizens of which revolted in her favour, but they paid dearly for their attachment to a much injured lady. In 1356 a trifling quarrel produced a war between him and Peter king of Arragon, in which the king's natural brother, Henry de Trastamare, who had, to avoid danger, retired into France, had a command under the latter sovereign. His wife, who was left in the power of Peter, was fortunately rescued from his vengeance. This escape so much excited his rage and suspicion, that he caused another natural brother, Frederic, to be murdered in his presence, and shewed his savage disposition by dining in the same apartment before the dead body was removed. He afterwards put to death his cousin, Juan of Arragon, and poisoned his widow, and his own aunt the queen-dowager of Arragon. His cruelties having driven many of the disaffected nobles to

take refuge in Portugal, he entered into a negociation with the king of that country, also called Peter the Cruel, to deliver them up, upon condition that, on his part, he should deliver up those Portuguese who had been concerned in the death of Agnes de Castro. This was punctually performed on both sides, and was the cause of many bloody executions. In 1361 he completed the measure of his domestic cruelties by the murder of his first queen, Donna Blanca, then confined in the fortrefs of Xeres. A short time after this he perfidiously put to death the Moorish prince of Grenada, Mahomet Barbarossa, with all his suite, who had attended on him at Seville, on the security of a safe conduct. His enormities at last produced a confederacy against him between the kings of Arragon and Navarre, and Henry de Trallamare, at the head of the emigrant Castilian nobility. Peter had, by no means, been deficient in vigour or success in carrying on the war against the king of Arragon, and his deposition was therefore much desired by that monarch, who, in fact, was nearly as perfidious and sanguinary as himself. A band of mercenaries, ready to fight in any cause, was brought out of France, under the command of Bertrand de Guefclin, and others; and Henry entering Castile was admitted into Calahorra, and proclaimed king. Advancing to Burgos, he received the homage of the nobles of Castile, and was solemnly inaugurated; while Peter retired to Portugal, and thence to Guienne, to the court of Edward the Black Prince. The treasures which he carried with him made him welcome to the prince and his barons, and the offer of Biscay, together, probably, with the notion of the duty of assisting the rightful sovereign, induced the gallant Edward to undertake his restoration. This he effected by an entire defeat which he gave to Henry and his party at the battle of Najara, in 1367. Peter would gladly have put to death his natural brother Sancho, and all his prisoners on this occasion, but was restrained by the humanity of the prince of Wales. He now paid no sort of regard to his promise of recompence to his victorious allies, and after refusing his crown, he indulged the severity of his nature by numerous savage executions.

Henry was not, however, disheartened by his misfortunes, but, after the departure of the English, collected his forces and engaged again the assistance of du Guefclin, and his men at arms. He entered Spain, and advanced to the plains of Monteil, where he met Peter at the head of a more numerous army, but composed of a very motly assemblage, there being among them many Jews and Moors. A battle ensued, in which Peter was completely defeated, and he was forced to take refuge in Monteil. He was, for want of provisions, soon obliged to quit this place, which he did at midnight with eleven companions, but was stopped and carried to the tent of his captor. His brother Henry, informed of the fact, arriving, words of reproach passed between them, and Peter caught Henry in his arms, threw him on the ground, and attempted to kill him. In the struggle, Henry was assisted by his attendants, and they dispatched the cruel Peter with their poniards. This happened in the year 1369, when he was only in the 36th year of his age, and in the 19th of his reign. He left a name justly execrated, though it is not unlikely that his crimes have been exaggerated, and it is quite certain that several of his contemporaries deserved the opprobrious title as well, and nearly as much as himself. Univer. Hist.

PETER of Sicily, so called from the island which gave him birth, was a man of noble descent, who flourished at the close of the ninth century. He was taken into the service of the emperor Basil, who, in the year 870, sent him into

Armenia for the purpose of negotiating an exchange of prisoners. This business, which he performed to the satisfaction of the emperor, having occasioned him to spend nearly nine months at Tibrica, the capital of Armenia, he embraced several opportunities of holding conferences with the Paulicians, a branch of the Manichæans, who were numerous in that country, and undertook the task of drawing up in Greek "A History of the Rise and Progress, and Decline of that Sect." The work to which he gave this title was dedicated by him to an archbishop of Bulgaria. Part of it was translated into Latin, and inserted by cardinal Baronius in his "Annals." It was afterwards published with the original, under the title of "Historia de varia et Stolidâ Manichæorum Hæresi." This work is an object of curiosity, as it presents us with a view of the sentiments of the Paulicians at the time in which Peter lived.

PETER of Blois, a learned French ecclesiastic in the 12th century, was a native of the city on the Loire, whence he derived his surname. Having been instructed in the classics and polite learning at Paris, he went to the university of Bologna, where he acquired great reputation by the proficiency which he made in the study of civil and canon law, and the various branches of profane literature. He then returned to France and devoted himself wholly to the study of divinity, under the celebrated John of Salisbury, bishop of Chartres, of whose church it seems probable that he was made a canon. In 1167 he travelled into Sicily with Stephen, son of the count of Perche, and cousin to the queen of that island, where he was appointed tutor, and afterwards secretary to William II. king of Sicily. When Stephen, who had been made chancellor of the kingdom, and archbishop of Palermo, was sent into banishment, Peter was involved in his fortune, and found it necessary to take refuge in his native country. Hence he was invited into England by king Henry II., at whose court he continued some time, and was nominated archdeacon of Bath. He next entered into the service of Richard archbishop of Canterbury, who appointed him his chancellor, and sent him to negotiate business of importance relating to the metropolitan see with king Henry II., and popes Alexander III. and Urban III.

After the death of king Henry, he resided for a time at the court of queen Eleanor. At a late period of his life he was deprived of his archdeaconry of Bath, though he was afterwards compensated for his loss by obtaining that of London, the duties of which he discharged with the utmost fidelity. He died in England in the year 1200. He is said to have been the first person who made use of the word *Transubstantiation*, to express the doctrine of the Catholic church on the subject of the eucharist. His remains chiefly consist of "Letters," 183 in number, which he formed into a collection by order of king Henry II., and which will be found useful in illustrating the civil and ecclesiastical history of the period in which he flourished. Moreri.

PETER, surnamed *Conestor*, or the Eater, another French ecclesiastic, was a native of Troyes in Champagne. Having embraced the clerical profession, he became canon, and afterwards dean of the cathedral in that city. Here he acquired such celebrity, that he was invited to Paris, where he was appointed dean of the metropolitan church. Some time after this, he resigned his benefices, renounced the world, and entered among the canons regular of St. Victor, at Paris, where he gave himself up entirely to study and devotion. He died in 1198. He was esteemed a man of learning for the age in which he lived, and he had the fortitude publicly to condemn some of the abuses and corruptions of the Romish church, particularly the celibacy of the clergy.

The

## PETER.

The following epitaph upon his tomb has been thought not unworthy of preservation.

“ *Petrus eram, quem Petra tegit, dictusque Comestor  
Nunc comedor. Vivus docui, nec cesso docere  
Mortuus; ut dicant, qui me vident incineratum,  
Quod sumus, ille fuit, erimus quandoque quod hic est.*”

He was author of “*Historiæ Ecclesiasticæ, lib. xvi.,*” containing a summary of sacred history, from the beginning of Genesis to the end of the Acts of the Apostles. To his pen has been attributed a work entitled “*Catena Temporum,*” &c. consisting of a compilation of universal history, published at Lubeck in 1475, in two vols. folio, of which a translation into French was published in 1488, under the title of “*Mer des Histoires.*”

PETER NOLASQUE, a saint of the Roman calendar, was founder of the order for the redemption of captives, commonly called the *order of MERCY*; which see. He was of noble descent, and born about the year 1189. Having lost his father when he was only fifteen years of age, he attached himself to Simon, count de Montfort, who placed him in the service of James, king of Arragon. By his talents and virtues, he recommended himself to the favour of that prince, a circumstance of considerable importance to him when he afterwards undertook the foundation of his order. The first design of it was suggested to him by a private society of gentlemen at Barcelona, who made a common purse for the express purpose of redeeming Christian captives, and relieving the sick. Struck with the generosity of their undertaking, he meditated a plan for converting this private society into a religious and military order. He laid his plan before the king, who sanctioned it with his approbation, and the order was established in 1123, under the title of “*The Confraternity of Mercy*;” at first it consisted of six priests and seven laymen, who, besides the customary vows, bound themselves to devote their personal exertions to the talk of redeeming captives from Mahometan slavery. Peter Nolasque was appointed the first superior-general; but this office did not exempt him from engaging in the common duties of the society. He is said to have been so successful in his two first expeditions into the kingdoms of Valentia and Grenada, as to redeem upwards of four hundred captives from their most oppressive bondage. He afterwards passed over into Africa, where he met with much ill treatment, while employed in zealously pursuing the object of his benevolent mission. In 1249 he resigned the office of superior-general, and he died in 1256. Peter Nolasque was canonized by pope Urban VIII. in 1628. Several houses of his order have been founded in France and other countries; but its principal establishments have always been in Spain. *Moreri.*

PETER, the Hermit, a celebrated person, to whom we have frequently, in the course of our volumes, referred, was born in the 11th century at Amiens, in Picardy. He entered into the army, and served under the counts of Bologne, but having imbibed the holy zeal of the age, he quitted the world, and devoted himself to a life of religious solitude and austerity. About the year 1095 he made a pilgrimage to Jerusalem, then in the hands of the Turks, and was deeply impressed with the oppressions sustained by the Christian inhabitants, and the visitors of that memorable city. In the warmth of his emotions, he promised the Greek patriarch to use his endeavours to rouse the western nations to arms in his behalf; and, upon his return, he waited upon pope Urban II. with letters from the prelate. The appearance of Peter was mean, his stature small, his body meagre, his countenance shrivelled, but he had a keen and

lively eye, and a ready eloquence. The pope received him as one who had a call from heaven, and encouraged him to proceed in his design; and Peter immediately set out on his travels as a missionary through the provinces of Italy and France. He rode on an ass, his head and feet being naked, and bearing a weighty crucifix; he prayed frequently, fed on bread and water, gave away in alms all that he had received, and by his faintly demeanour, and fervid address, drew innumerable crowds of all ranks to listen to his preaching. When he painted the indignities offered to the true believers at the birth-place and sepulchre of their Saviour, every heart was melted to compassion, and animated to revenge. His success in raising recruits for the holy war, was such as might have been expected from the rude enthusiasm and martial spirit of the age. (See *CROISADE* and *GODFREY.*) Collecting above 60,000 persons of both sexes, and of the lowest ranks in life, from the borders of France and Lorraine, he proceeded with them along the banks of the Rhine and Danube. The progress was marked by pillage and disorders of all kinds, and by the massacre of all the Jews that came in their way. As they approached the confines of Hungary and Bulgaria, the fierce natives of those countries arose upon them, and cut them off in such numbers, that only a third part, with Peter himself, escaped into Constantinople. Almost all these were afterwards slain by the Turks in the plain of Nice, while Peter had prudently withdrawn from the camp, and remained in the Greek capital. He was, after this, in 1097, at the siege of Antioch, but his ardour was considerably cooled, and he would gladly have made his escape, but Tancred caused him to swear that he would never desert an expedition of which he had been the prime mover. He afterwards distinguished himself at the siege of Jerusalem, and has been celebrated in the verse of Tasso. After the capture of that city, he was appointed by the patriarch, during his absence in Godfrey’s army, to act as his vicar-general. Peter died at the abbey of Neumoutier, near Huy, of which place he was the founder. *Gibbon, vol. xi.*

PETER I. styled the Great, emperor of Russia, was the third son of the czar Alexis Michaelovitch. He was born at Moscow in the year 1672, and on the death of his eldest brother, in 1682, he was nominated to the succession, in exclusion of his other brother Iwan, who was set aside on account of incapacity. Shortly after, a terrible mutiny of the guards, fomented secretly by the princess Sophia, the adult sister of Iwan and Peter, effected a revolution at court, and the two princes were nominated joint czars, under the tutelage of Sophia. Iwan was a mere cypher, but Peter early displayed a spirit which shewed that he was not formed to be under controul. His education was much neglected, and early habits of intemperance inflamed the violence of his temper, and augmented a disposition to convulsive or epileptic fits. It was not long before he attempted to put himself beyond the influence of Sophia; he married against her will, in his 18th year, and claimed a seat at the council board, from which the procured his exclusion, and an open rupture was the consequence. Peter took the bold resolution of arresting and imprisoning his sister, who, on her part, is said to have formed a conspiracy against her brother’s life, or, at least, against his liberty. Peter prevailed, confined his sister to a nunnery for life, and assumed the reins of government in 1689. Although he had given way to the sensuality natural to a young prince in a rude and dissolute court, yet he appears early to have had just ideas of those state reforms, of which former sovereigns in Russia, and especially his father, had given some examples. He had been employed in training a small body of troops in the German

## PETER.

or foreign discipline, and he now began to display that attachment to maritime affairs which afterwards so much distinguished his reign. His great fondness for navigation is dated from the year 1691, when accidentally taking notice of a decayed sloop near Moscow, and being informed that it was of foreign construction, and built to go against the wind, he caused it to be repaired by a Dutch shipwright, whom his father had invited into Russia, and was highly pleased by observing its manœuvres. He soon learnt to manage it himself, and afterwards had several small vessels built, with which he made excursions on the lake of Perislaw. The passion for sailing gained so much upon him, that in 1693 he went to Archangel, and took a short voyage on the White sea, attended by all the merchant-ships in that harbour, and in the following year he spent several months in similar expeditions.

A quarrel with the Turks, in 1694, opened to the czar views of aggrandizement on the Black sea, and in the following year an army was marched to lay siege to Azof. He was with it in person, but only in the capacity of a volunteer, for he was fully sensible of the necessity of instruction as a preliminary to command. The failure of the first attempt to reduce the place, through want of ships to block up the harbour, coincided with his passion for navigation in stimulating him to create a fleet. He immediately gave orders for the equipment of a flotilla; which was effected with so much celerity, that during the next summer his squadron appeared before Azof, defeated the Turkish gallees stationed there, and the town surrendered. Of this conquest he was very proud, and caused his army to make a triumphal entry into Moscow, in which his generals and admiral took the precedence over himself, as well as over his principal nobility. In the mean time he had left orders for a large addition to his fleet on the Black sea, in which were included several sixty-gun ships. His brother Iwan dying about this time, he became in title, as well as in effect, sole sovereign of Russia. But as his mind expanded, he was rendered more sensible of the barbarism of this vast empire, and of his own deficiency in knowledge to improve and civilize it. The first plan that suggested itself was to send abroad a number of the young nobility, in order that they might learn, in various countries, the arts which he thought essential to the state, especially naval and military tactics. His own improvement was what he had most at heart, and he was resolved to pursue it by foreign travel, and a continued residence in those countries which he thought likely to afford that kind of knowledge of which he chiefly stood in need. He was not at present sufficiently enlightened to make a proper estimate of the relative value to a sovereign of different branches of knowledge, and his passion for maritime affairs took too great a lead in marking out his objects. It was, however, an interesting and extraordinary circumstance in the history of the world, that the despotic monarch of a mighty dominion should descend from his throne, and travel in the train of his own ambassadors as a private person, rejecting all the pageantry of state, and disdaining no means which appeared necessary to perfect himself in those arts which he thought of essential importance to his country. He set out on his travels in 1697, and the first country in which he made any stay was Holland. At Amsterdam he took up his quarters in the admiralty yard, in order that he might have a constant eye upon all that was passing. In the disguise of a Dutch skipper he went to the famous ship-building village of Sardam, where he actually laboured as a common carpenter and blacksmith, clad and fed like his fellow workmen. He did not, however, confine himself to the mechanic arts. He frequently went to Amsterdam to

attend the anatomical lectures of the celebrated Ruysch. He studied natural philosophy, astronomy, and geography, and he sought out able men in various professions, whom he sent to Russia. At the same time he was exceedingly attentive to what was passing in the world, with respect to war and politics. He engaged to support the election of Augustus of Saxony to the throne of Poland, and issued orders to his armies on the Turkish frontier. In 1698 he came over to England, where he was treated with great attention by king William. He took lodgings at the King's-yard, Deptford, and continued to devote his time principally to obtaining instruction in naval affairs, but without neglecting other objects of useful curiosity. It is said that the variety of religious sects attracted his notice both here and in Holland, and probably gave him those ideas of religious toleration upon which he always acted in his intercourse with foreigners. At his departure the British monarch made him a present of a fine yacht completely equipped. He returned in it to Holland, carrying with him a number of naval officers, and other persons illustrious in various arts and professions. Thence he proceeded with his ambassadors to Vienna, for the purpose of viewing the military discipline of the Austrians, and strengthening his alliance with that court against the Turks. The return of the czar to his own country was hastened by the news of a formidable rebellion, excited with the view of placing on the throne the princess Sophia. Peter passing through Poland, had an interview with Augustus, in which they laid the plan of co-operation against the king of Sweden, and he then unexpectedly appeared at Moscow. He instantly enquired into the causes and effects of the revolt, and was prompt in punishing the aggressors with the most unrelenting severity. Many of the leaders in the conspiracy he caused to be tortured and hung before the windows of the apartments of Sophia. And her he obliged to take the veil, and to pass the remainder of her life in strict confinement. He now formed new regiments after the German model, and the dress and discipline of the rest of Europe were introduced into the Russian army. Peter proceeded with his characteristic rigour in his other meditated reforms. The established church in Russia had almost obtained an independence of the civil power, and the patriarchs had often been formidable to the czars. Peter, who had seen in England that the king was head of the church, though he did not follow his example, yet on the death of the patriarch in 1699, he suffered that office to remain vacant till its final abolition in 1721; and he obliged the ecclesiastical synod to take a strict oath of allegiance to himself and his successors. He introduced likewise many salutary reforms into the church. The Russian year had hitherto begun in September; Peter removed it to the first of January; but the new style, which is of much more importance to the commercial interests of the world, has not even yet been introduced into Russia. In all the minor particulars of manners and customs he introduced alterations, the object of which was to assimilate the Russians with the more polished nations of Europe. In some points he exhibited too great a precipitancy, a common fault with despotic monarchs, but in general his ideas were liberal, and his reforms tended to the real advantage of the people whom he governed. In the year 1700, a confederacy was formed against the young king of Sweden, Charles XII. Peter joined in it with the view of recovering the provinces of Ingria and Carelia, which had formerly belonged to Russia. For this purpose, he marched a large army, with which he laid siege to Narva. Charles hastened to its relief with a very inferior force, but

having

having well disciplined troops he soon obtained a complete victory over the Russians, who fought without judgment or skill. Peter was not dispirited; he melted down the great bells of his churches to repair his loss in artillery, and exerted all his powers to recruit and discipline his troops. After various actions with different success, the Russians gained a footing in Ingria and Livonia, and became masters of the river Neva. The place where that river enters the gulf of Finland appeared to him a proper spot for a port, by means of which he might obtain a share of the navigation of the Baltic; and having formed the plan, no obstacles could prevent him from the accomplishment of his purpose. A morass surrounded with forests, in the 60th degree of north latitude, was the uninviting site which he chose for a new capital of his empire. The first erection was a fortress on an island, the foundation of which was laid in May 1703. A hut, for his own residence on a neighbouring island, a larger wooden house for his favourite Mentsekikot, and an inn, were the first buildings of St. Petersburg. Such was the eagerness with which he pursued his design, with all the resources of despotic power, that in less than nine years from these rude commencements, the seat of empire was transferred from Moscow to Petersburg. A vast number of lives was sacrificed in carrying on these labours, but human life never enters into the calculations of despots. Every thing must be subservient to their will. Nor could any thing be more arbitrary than the means he took to fill it with inhabitants; one of which was to oblige all the nobility and principal merchants to have houses in the new capital. But it was chiefly inhabited by foreigners, whom he encouraged to settle in his dominions, and even to the present time foreigners and their descendants make a great part of its population. The removal of the metropolis to a corner of this vast empire, at such a distance from its most desirable districts, and from the neighbouring courts, was thought to be highly impolitic, but it proved to be very instrumental in civilizing the great body of the people, by breaking those national habits of life which were fostered in the barbaric grandeur of Moscow. In the year 1704, the czar, in person, took Narva by assault. On this occasion, his soldiers committing the usual excesses in a captured town, he was, though at much personal risk, extremely active in restoring order and tranquillity. Entering the town-house, whither many of the citizens had retired for refuge, he laid his bloody sword on the table, and exclaimed, "It is not stained with the blood of the people of Narva, but with that of my own soldiers, which I have shed to preserve your lives." Cruelty to a vanquished foe was not among the characteristics of Peter. He continued faithfully to adhere to the interests of the king of Poland, after he had been dethroned by Charles, and the king of Denmark had been compelled to remain neuter. After the humiliating peace made by Augustus, Russia remained the sole object of hostility to the hero of Sweden: the dethronement of the czar was his avowed aim; "but," said Peter, "though my brother Charles affects to act the Alexander, I trust he will not find me a Darius." In 1708, Charles advanced to Grodno, where he narrowly missed taking the czar prisoner. He pushed forwards towards the Dnieper, and gave the Russians, who opposed him, a total defeat, though so much were they improved by practice and discipline that they stood seven charges before they gave way. Charles now crossed the Dnieper, and marched to meet the Cossack Mazeppa in the Ukraine. In the mean time his general, Lewenhaupt, was leading an army in Livonia to reinforce him. Peter, in person, attacked Lewenhaupt at Lefnau, with a force not

much superior in number, and after a desperate conflict of three days, took or destroyed half his army. This success was the prelude of the great victory at Pultowa, in June 1709, which entirely defeated all the plans of the Swedish monarch, and made him an exile among the Turks. Augustus was replaced on the throne of Poland; Prussia made an alliance with Russia; Elbing, Wiburg, and Riga yielded to Peter's arms; and Carelia and Livonia acknowledged him as their sovereign. In 1711 the Turks declared war against Russia, in the course of which the grand vizier would infallibly have captured Peter and his whole army, had he not found means to induce him to enter into a negotiation. The principal instrument which he used on this occasion, and which freed him from so perplexing a situation, was a woman, whom, from the lowest origin, he had raised to be the partner of his bed, and to whom he had been privately married. This was the empress Catharine I., originally a parish foundling, and who had passed through various hands to those of her sovereign. By the sweetness of her voice, and the mildness of her manners, she was able to soothe her sovereign and lord, in all the paroxysms of rage and gloom to which he was occasionally subject; and she retained her influence over him to the very last moment of his life. He rewarded her services in this important instance, by a public declaration of marriage in the following year, and by the institution of the order of St. Catharine, of which she was the head and patroness.

Peter being at peace was left to pursue his designs, and in the years 1713 and 1714 he effected a total reduction of Finland, and a victory of the Russian fleet over the Swedish rendered him master of the isle of Oeland. The czar soon after visited Copenhagen, and a grand plan was formed for the invasion of Sweden by the Danes and Russians, in conjunction with an English and Dutch fleet: it was, however, rendered abortive, probably, by means of a secret negotiation entered into between the czar and the Swedish minister baron Goertz, in which very advantageous terms were granted to Russia, in order to obtain a peace. Some great revolutions in the north of Europe entered into the projects of this daring minister, one of which was placing the pretender on the throne of England. About this time he was making another tour, in which he combined the purpose of introducing improvements in his dominions, with that of carrying on political intrigue. He went from Denmark to Hamburgh, and thence to the Hague, and in 1717 he visited France, where he opened to the regent, duke of Orleans, a plan calculated for the advantage of France and Russia, in which were comprized peace with Sweden, the humiliation of Denmark, and the disturbance of England; but that prince's close connection with George I. prevented him from listening to it. Soon after his return a domestic event took place, which was one of the calamities of Peter's reign, and has left a stain on his memory that can never be obliterated. His son Alexis, born in 1690, was the sole offspring of his first marriage with Eudocia Lapookin; his education had been much neglected, and he had imbibed deep prejudices, and a rooted aversion from his father's improvements. As he grew up, he contracted habits of intemperance and gross debauchery, with a fondness for the lowest company. His father probably never entertained for him a spark of the paternal affection, and treated him with a harshness that rendered him always uneasy in his presence. Alexis married a very amiable woman, whom he made wretched by his brutality, and she died very soon after she had brought him a son, in the year 1715. In the following year, renouncing his right of succession in favour of Peter's son by Catharine, he requested permission

permission to retire into a convent. But during the czar's absence he secretly left Russia, and put himself under the protection of the emperor Charles at Vienna. By him the prince was sent first to Inspruck, and then to the castle of St. Elmo in Naples. He was discovered in this retreat, and having had the most solemn assurances of forgiveness he was induced to return to Moscow. The promises of the tyrant were no bar to his revenge; and having him again in his power, he determined to proceed against him for high treason, a crime in that country, as in many others, which is made to suit the wishes of despotic princes and sanguinary ministers. There was no difficulty in Russia in obtaining a conviction: the will of Peter was a rule to all his subjects, from which they did not dare to deviate. The sentence was read to the young prince on the sixth day of July 1718, and on the next day it was reported that his agitation of mind had thrown him into violent convulsions, and that his life was in danger. The czar, with some of his courtiers, repaired to the chamber in which he was confined, where, it is said, the prince implored forgiveness, which he received, but that on the same day he died. Many mysterious circumstances, however, attended his death, and it was generally believed he was taken off by poison. The death of the king of Sweden in the year 1718, and the arrest of his minister Goertz, entirely deranged the czar's plans, and he was obliged to continue the war against that country without allies. A rupture ensued between Russia and England, but a peace was concluded with Sweden, under the mediation of France, in the year 1721. On this occasion the senate of Russia requested the czar to assume the title of "Peter the Great, father of his country, and emperor of all the Russias," and his imperial title was very soon after recognized by all the European states excepting Denmark. He now removed the principal mart of trade from Archangel to Petersburg, which was already become a large and handsome city. After a triumphal entry into Moscow, his second son Peter being dead, he obliged all his people to swear that they would acknowledge as successor to the crown any person whom he should please to nominate.

As he had opened the Baltic sea to his subjects at one extremity of his dominions, he now resolved to attempt the same with respect to the Caspian at the other extremity. Making use of the pretext of some violence that had been offered to his people by certain tribes of Persians and Tartars, he fitted out a fleet at Astrachan, and on the Volga, and marched with a considerable body of troops in May 1722, to embark for an expedition into the provinces bordering on the Caspian sea. Peter having carried the point at which he aimed, several Persian provinces were ceded to him in perpetuity, and a treaty of peace was concluded. His empire being now entirely at peace, and some of his great schemes brought to maturity, he thought proper to give a public demonstration of his affection and gratitude to Catharine, by the ceremonial of placing upon her head the imperial crown, with his own hands. This coronation took place at Moscow, in May 1724, and was considered as preparing the nation to receive her for its sovereign in case of his death. He had undergone a severe attack of illness some time before that period, the effects of which seem never entirely to have left him. His activity was, however, still unremitted, and he was particularly assiduous in forming useful and ornamental establishments for his new capital, one of which was an academy of sciences. A cold, which he took at the ceremony of blessing the waters, brought on a painful disorder, which put an end to his life in January 28, O.S. 1725, being in the 53d year of his age. He left no will, nor made any distinct nomi-

nation of a successor. The measures by which the succession of Catharine was secured have been mentioned in her article. Peter the Great left three daughters by Catharine, and one grandson by the unfortunate Alexis.

"This great prince," says his biographer, "was of a lofty stature, and of a commanding but rude and ferocious countenance. His gestures were quick and impatient, his speech fluent and animated. His manners were gross and uncultivated, and in the midst of his attempts to civilize the nation, he himself remained a semi-barbarian. He was, however, easy and familiar with his intimates, and with those from whom he expected to derive instruction; and, like all truly great men, loved to lay aside pomp, and bring himself to the level of his company. He was furious and ungovernable in his fits of anger, and cruel and inexorable in his punishments, in which he occasionally officiated as executioner; he was, however, capable of sentiments of justice and humanity when brought to cool reflection. His talents were certainly considerable, and although he did not always take the best road to instruction, his personal acquisitions were various and respectable. If he is estimated by what he performed, very few princes in any age can be compared to him. Russia at his accession to the throne did not possess a single ship of war, and he left it with forty ships of the line and four hundred galleys. It was excluded from the Baltic, and he founded a maritime capital on a branch of that sea. He converted a seditious and half-disciplined militia into a regular army, capable of meeting the best troops in Europe. He introduced a police into the great towns, which rendered them secure and comfortable abodes. He planned, and partly executed, a grand system of inland navigation, by which a junction is formed between the remotest parts of that extensive country, and the seas surrounding it. (See CANAL.) He was the creator of a great number of institutions for the promotion of learning and the useful arts and sciences, among which may be enumerated colleges, at the principal cities, for the languages and mathematics, an academy of marine and navigation, a college of medicine, with anatomical lectures, and a botanical garden, an astronomical observatory, an imperial library and printing-offices, the academy of sciences at Petersburg, which he instituted, though death prevented him from putting it into activity. He reformed the architecture of the country, and introduced many improvements in the commerce of private life. He did not, indeed, civilize a nation which long after retained many traces of barbarism, but he roused it from its torpor, gave it the means of future improvement, and was the principal author of that political importance which it has since attained. The epithet *Great* belongs to him by so many titles, that it is probably a permanent appendage to his name." *Mod. Univer. Hist. Coxe's Travels, vol. ii. Tooke's Russia.*

PETER II. the son of the unfortunate Alexis, and grandson to Peter the Great, was born in the year 1715, and succeeded in 1727 Catharine I. He died in 1730 of the small-pox, in Moscow, on the very day which had been appointed for his marriage. His death was occasioned by the ignorance of the physicians, who treated his disorder as a malignant fever. Peter II. acquired a considerable degree of popularity, by fixing, during the latter part of his short reign, his imperial residence at Moscow. He was regretted as the grandson of Peter the Great, and as the person in whom the male line of the house of Romanoff became extinct. *Coxe's Travels, vol. ii.*

PETER III. emperor of Russia, born in 1728, was the son of Anne, eldest daughter of Peter the Great, and Charles Frederic, duke of Holstein-Gottorp. He was nominated

minated grand-duke of Russia, and successor to the crown, by his aunt the empress Elizabeth, in 1742, after having conformed to the Greek church, and in 1745 he espoused Sophia Augusta, princess of Anhalt-Zerbst, who took the name of Catharine. Peter had received a bad education, and was estranged by Elizabeth from public affairs. Being, therefore, a prey to idleness, he gave himself up to trifling pursuits, and indulged in low sensualities. One of his principal amusements was the training of his servants, and a small body of soldiers, which he was allowed to keep at his palace, in the German discipline. He constructed a petty fortress, in which he acted as governor, and assiduously practised all the minutiae of military service. At the same time, he bore with impatience the constraint in which he was held by the empress, and often broke out into invectives, which, by the spies placed about him, were carried in an exaggerated state to her ears. Nor did he conceal his hatred and contempt of the Russian nation, nor his partiality to foreigners, in whom he seemed to place the most unbounded confidence. Elizabeth, therefore, urged by the chancellor Bestuchef, was nearly persuaded to set him aside from the succession. She did not, however, persist in this intention, and on her death, in December 1761, Peter ascended the throne without opposition, and with all the joy of a person enlarged from a long imprisonment into a state of perfect liberty. He immediately released the principal state prisoners, who had been confined by Elizabeth; among these were Biren, duke of Courland, marshal Munich, and Lestof; and in all state affairs he conducted himself upon political principles, diametrically opposite to those of the late empress. He recalled also from exile the victims of the despotism of the former reign, who are said to have amounted to seventeen thousand persons. He abolished the dreadful secret state inquisition, and formed a plan for correcting abuses in the courts of judicature. He freed the nobles from the obligation of serving in the army, and permitted them to visit foreign countries without particular licence. An extravagant admiration of the great Frederic of Prussia was one of his passions, and he became an ally to that monarch. At the same time he formed a design of conquering the duchy of Sleswick from Denmark, which he conceived belonged to him as duke of Holstein. Although, as has been observed, he introduced important changes in the government, yet the salutary part of them was accompanied with projects of innovation, some of them trifling, and others at least dangerous and imprudent. He offended the Greek clergy, by secularizing their monasteries, and seizing their estates, and by shewing a contempt for the rites and ceremonies of that church, and a preference to the Lutheran, in which he had been educated. He gave umbrage to the army by his partiality for his Holstein troops, and his rigour in introducing the Prussian discipline; and he affronted the nobility by the appointment of his uncle, prince George of Holstein, to the post of generalissimo, and by the exclusive confidence which he placed in foreigners. But his conduct to the empress Catharine was that which especially hastened his ruin. He had frequently treated her with great indignity, and at length did not scruple to avow an intention of arresting and repudiating her, setting aside her son, the grand duke Paul, from the succession, as not being his, and marrying his favourite mistress, the countess of Woronzof. Catharine was, however, beforehand with him, and a revolution was effected completely in her favour. Peter was forced to sign his own abdication in the most humiliating terms. After this he was sent a prisoner to Robscha, a small palace at some distance from Peterburg, where he was in a very few days murdered, at the age of thirty-four, after he had reigned only half a year. *Coxe's Travels*, vol. iii.

PETER, commonly called the Wild Boy, was found in the woods near Hamelyn, in Hanover, in the year 1725. He was, from his appearance, supposed to be about twelve years of age, and had subsisted in those woods upon the bark of trees, berries, &c. for a considerable time. How long he had been in that state could never be ascertained, but when found, the remains of a shirt collar were about his neck. He was brought to England in the following year, by order of queen Caroline, but though every attention was paid to him, he could never be brought to speak. It was pretty well ascertained that he was an idiot. He was placed under the care of a farmer at North Church in Hertfordshire, where he lived on a stipend of 35*l.* per ann. allowed him by the government.

PETER-PENCE, an ancient levy, or tax, of a penny on each house throughout England, paid to the pope.

It was called *Peter-pence*, because collected on the day of *St. Peter ad vincula*; by the Saxons it was called *Rome-feoh*, i. e. the fee of Rome, and also *Rome-foot*, and *Rome-penny*, because collected and sent to Rome: and lastly, it was called *hearth-money*, because every dwelling house was liable to it, provided there were thirty pence *viva pecunia* belonging to it, nay, and every religious house; the abbey of *St. Alban's* alone excepted.

This Peter-pence was at first given as a pension or alms, by Ina, king of the West Saxons, in the year 727, being then in pilgrimage at Rome: and the like was done by Offa, king of the Mercians, throughout his dominions, in 794: and afterwards by Ethelwulph, through the whole kingdom, in the year 855.

It was not intended as a tribute to the pope, but chiefly for the support of the English school or college at Rome; the popes, however, shared it with the college; and at length found means to appropriate it to themselves.

At first it was only an occasional contribution; but it became at last a standing tax; being established by three laws of king Canute, Edward the Confessor, the Conqueror, &c.

The bishops who were charged with the collecting it, employed the rural deans and archdeacons in the business.

Edward III. first forbade the payment, but it soon after returned, and continued till the time of king Henry VIII. when Polydore Virgil resided here as the pope's receiver-general.

It was abolished under that prince, and restored again under Philip and Mary; but it was finally prohibited under queen Elizabeth.

PETER, *St.*, in *Geography*, a town of the duchy of Stiria; four miles S.E. of Landspurg.—Also, a town of the same duchy; three miles W.N.W. of Windisch Weilitz.—Also, a town in the same duchy; six miles W. of Cilley.—Also, a town of Austria; 12 miles W.S.W. of Freutadt.—Also, an island on the river Rhine, strongly fortified, near Mentz.—Also, a town on the S.W. coast of the island of Cape Breton, in a bay to which it gives name, and which is a very commodious place for carrying on the fishery.—Also, a small island in the West Indies, among those which form the cluster called “Virgin islands,” dependent on Virgin Gorda.

PETER'S, *St.*, a town of the island of Antigua.—Also, a town of the island of Stronfa. N. lat. 59. W. long. 2° 31'.—Also, a river on the coast of Labrador, about four leagues from the island of Belle-isle, in the straits of that name.—Also, a river of Louisiana, being one of the north-western branches of the Mississippi river, which it joins in about 45° 6' N. lat. W. long. 94° 22'.

PETER'S, *St.*, *Bank*, a large fishing ground off the S. end

of Newfoundland island, extending from Cape Race to St. Peter's island, opposite Placentia, St. Mary, and Trepassy bays. It has on it from 45 to 30 fathoms of water.

PETER'S, *St., Bay*, a bay on the S. coast of Cape Breton island. See *St. PETER, supra*.

PETER'S, *St., Fort*, a fort on the island of Martinico, in the West Indies. N. lat.  $14^{\circ} 44'$ .

PETER'S, *St., Harbour*, on the N. coast of the island of St. John, in the gulf of St. Lawrence, about eight leagues W. of E. point. N. lat.  $46^{\circ} 25'$ . W. long.  $62^{\circ} 20'$ .

PETER'S, *St. Haven*, a harbour on the E. coast of Labrador. N. lat.  $56^{\circ} 31'$ . W. long.  $60^{\circ} 42'$ .

PETER'S, *St., Island*, a small island on the W. coast of St. John's island, near to, and N. by W. of, Governor island, in the narrowest part of the strait between New Brunswick and St. John's island.

PETER'S, *St., or St. Pierre's Island*, an island on the coast of that of Newfoundland, S.S.W. of the S.E. point of Fortune bay, and near to, and S.E. of the S. point of Miquelon island. This island is chiefly used for curing and drying fish. N. lat.  $46^{\circ} 46'$ . W. long.  $56^{\circ} 17'$ .

PETER'S, *St., Lake*, an expansion of the river St. Lawrence, into which are discharged from the S. and E. Sorel river from lake Champlain, the river St. Francis, and some smaller rivers from the N.W. The Masquinonge, Omachis, &c. enter the lake. The centre of it is 68 miles above Quebec, and 205 N.E. of Kingston, at the mouth of lake Ontario.

PETER'S, *St., Mount*. See KEENE BALOO.

PETER'S, *St., Wort*, in Botany. See ASCYRUM.

PETER'S, *St., and St. Paul*, in Geography. See AVATSCIA. Captain King, in the third volume of captain Cook's "Third Voyage," has given a plan of this harbour, which he places in N. lat.  $53^{\circ} 0' 38''$ . E. long.  $198^{\circ} 43'$ : the variation in 1779 being  $6^{\circ} 19' E$ .

PETER, *St., and St. Paul*, a river at the bottom of the gulf of Campeachy. Its branches form an island, called "Tabasco."

PETER, *St., le Port, or Port St. Pierre*, a town situated on the S.E. part of the island of Guernsey, defended by two castles, viz. the old castle and Gornat castle. N. lat.  $49^{\circ} 10'$ . W. long.  $2^{\circ} 34'$ . See GUERNSEY.

PETER'S Point, a cape of England, on the coast of Lincolnshire; four miles S. E. from the mouth of the Witham.

PETERBOROUGH, or PETERBURGH, a city having separate jurisdiction, is situated at the eastern extremity of the county of Northampton, bordering on the great fens of Lincolnshire, at the distance of 81 miles N. by W. from London. It is built on the north bank of the river Nen, and the country adjacent has been termed, from its fertility, the "Nile of England." This spot was originally called Medeshamstede, and here was at least a village, if not a considerable town, early in the 6th century. Though not made a city till the reign of Henry VIII., yet at a very remote period this place was distinguished in the Anglo-Saxon annals for its monastery, which was large in its establishments, and extensive in its jurisdiction. So closely is the interest which Peterborough possesses interwoven with the history of this conventual foundation, that in describing the one, it is requisite to enter into a short account of the other. The foundation of this abbey was laid by Penda, eldest son of Penda, king of the Mercians, in 655 or 656; but dying in the fourth year of his reign, it was completed, in 664, by Wolfere, his brother, who succeeded him, assisted by Ethelred, the remaining son, Kynesburga and Kyneswitha, the two daughters of Penda, and Saxulf, a pious and prudent earl, who was made the first abbot. It was dedicated to St. Peter at an assembly of nobles and

bishops, and endowed with large immunities and possessions, which were confirmed by the charter of Wolfere in the 7th year of his reign. Pope Agatha ratified these endowments, and constituted it a vice-papal see, where persons might "pay their vows, be absolved from their sins, and receive the apostolical benediction." The monastery flourished for nearly 200 years, under a succession of seven abbots, when the Danes, commanded by Hubba, in 870, after desolating the abbeys of Croyland and Thorney, almost annihilated Medeshamstede, plundered its dependencies, destroyed the library, and slaughtered the venerable abbot, Hedda, together with the friars and the country people, who had fled to its altars for protection. The monastery is reported to have remained in ruins 96 years, till Athelwold, bishop of Winchester, in 970, assisted by king Edgar, and the archbishops Dunstan and Oswald, rebuilt it on an enlarged scale, and confirmed its former privileges and possessions. At this period the name of the town was changed to Burgh, and from the splendour and privileges of the monastery, it was generally called Gildenburgh. In reference to the saint to whom the dedication was made, this name was afterwards changed to Peterburgh. Under several succeeding abbots the fortunes of the establishment were variously chequered, but nothing remarkable happened until the abbacy of Thoroldus, when the Danes, under Sweyn, destroyed the town, but were unsuccessful in their repeated attacks against the monastery. In the year 1116, it was consumed again, by an accidental conflagration, which left only the chapter-house, dormitory, and refectory standing. By the same fire the greater part of the town was likewise destroyed. In 1118, John de Salisbury, the reigning abbot, commenced a new church, which was finished under Martin de Vecti in 1144. Under William de Waterville various architectural improvements and additions were made in the church, &c. The abbots were called to the house of peers in the time of Henry III. and were mitred in 1400. Queen Catharine, the first wife of Henry VIII., was interred here in 1535. In 1541 the monastery was converted into an episcopal see, and the conventual church into a cathedral. The government of it was entrusted to a bishop, a dean, and six prebendaries, whose jurisdiction extended over the city of Peterborough, and nearly the whole of the counties of Northampton and Rutland. In the reign of queen Mary this church was again submitted to the authority of the see of Rome, but under Elizabeth, Protestantism revived to the exclusion of Popery. In 1587, the funeral of the hapless Mary, queen of Scots, was here solemnized, unattended by splendour or ceremony: her remains were translated to Westminster in the reign of James I. 1612. During the rebellion of 1643, the cathedral experienced various acts of violence from the parliamentary forces; the stalls, organ, books, monuments, and every ornamental decoration, shared an equal destruction. After remaining eight years in a state of ruin and desolation, its damages were in some measure repaired, and the whole edifice restored for the performance of divine service.

The style of architecture prevalent in this building is that denominated Norman, of which the circular arch and large column, with analogous mouldings, form the leading characteristics. It has been erroneously termed Saxon in the present instance, although no part of the existing cathedral was erected antecedent to the year 1118, when the monastery was destroyed by fire. The plan, like that of most other cathedrals, consists of a nave with side aisles, a transept, a choir terminating at the east end, semicircularly, with a continuation of the side aisles of the nave. The whole is finished at the east, by what is called the new building,

building, or St. Mary's chapel. In the centre is a tower rising from four large arches, at the intersection of the nave, choir, and transept. The west front is formed by a recessed portico of three lofty arches, surmounted by pediments, pinnacles, and spires. In the centre arch is a small chapel. The dimensions of the cathedral, with its several parts, are; length externally, including the buttresses, 471 feet; of the nave, from the west door to the entrance into the choir, 267; of the choir, 117; and from the altar of the choir, to the east window, 38; making, in the whole, from the west door to the east window, 422 feet. The length of the transept, from north to south, is 180 feet. The height of the nave, from the floor to the ceiling, is 81 feet; of the central tower, from the floor to the summit, 135; whilst its whole height externally is 150 feet. The breadth of the nave and aisles, from the north wall to the south, is 78 feet, and the breadth of the west front 156. The periods of erecting the various parts of the cathedral may be assigned thus: the choir, with its aisles, from the circular extremity at the east, to the commencement of the transept on the west, was begun in the year 1118, and finished in 1144. Between the years 1155 and 1177, the transept was erected, and between 1177 and 1193, the nave, with the aisles, were completed to the termination of the pillars. A farther addition was made about 1288, when the space between the extreme western pillar and the door of entrance was finished, forming a projection on each side of the western extremity, and terminated by two towers. The Lady's chapel, said to have been on the east side of the north transept, was built by William Parys, the prior, in the 14th century. At what period the west portico, with its three arches, was erected, is not precisely known, but we presume before the year 1274, as abbot Richard de London raised one of the western towers before that year. The chapel in the centre arch, is in the style of architecture of a much later date than the western front. The new building, at the eastern extremity of the choir, was erected by Richard Ashton in the middle of the 15th century, and probably completed by abbot Kirton about 1518. This building formed the last addition made to the church before the dissolution of the monastery by Henry VIII., making a period of 400 years, from the foundation of the present church to its final completion. On the south side were the cloisters, which are nearly destroyed.

The Clofe, to the west of the cathedral, is nearly surrounded by ancient monastic buildings, the south side of which presents several fine and interesting parts of ancient architecture. On this side is also the bishop's palace: north of the cathedral is the deanery, the entrance gateway to which was built by abbot Kirton, as the sculpture and arms plainly indicate.

Nearly in the centre of the city is a parochial church, dedicated to St. John, which is said to have been originally erected about the year 1400, by abbot Genge, assisted by the citizens. The church is spacious, and contains several monumental slabs. Over the altar table is a large picture, painted by sir Robert Ker Porter.

Symon Gunton, author of the History of the Cathedral, was a native of this place, in which he resided the greater part of his life, and where he died in 1676.

It is remarkable that Peterborough is the only city in England without mayor and aldermen. The civil government of the city is vested in seven magistrates, and in the bailiffs to the lords of the manor. There are two members sent to parliament, elected by the inhabitants, who pay scot and lot. A quarter session is holden here for the city and liberty, by a commission of oyer and terminer and gaol

delivery, for criminal actions of all kinds. The chief of the commission is the custos-rotulorum, who is appointed by the crown at pleasure. There are two gaols, one belonging to the earl of Exeter, for persons taken within the liberty by his bailiff, the other belonging to the dean and chapter, for persons arrested by their bailiff in the city.

The trade of Peterborough is very inconsiderable. The benevolent institutions are a charity-school, a workhouse, and Sunday-schools for the children of the poor. Various kinds of fish are caught in the river, over which is a bridge, erected by abbot Godfrey, in the fourth year of Edward II. From being half in the county of Huntingdon, and half in Northamptonshire, a question arose once, by which it should be repaired; a jury was impanelled, six from each county, to determine it; and they returned, upon examination, "there was none of right bound to repair, or sustain the same." But the king and queen coming to Peterborough, the bridge was repaired by abbot Adam, for their passage into the city. At present it is kept up by the feoffees, who, in 1790, thoroughly repaired it. The market is on Saturday, and there are two annual fairs. By the census of 1811, Peterborough was stated to contain 900 houses, and 3674 inhabitants.

At Milton, about three miles west of Peterborough, is a seat of earl Fitzwilliam. At another seat of the same nobleman, not far distant, was found, in 1720, a Mosaic pavement, and it is supposed by antiquaries, that near it was a Roman villa of some distinction. Beauties of England and Wales, vol. xi. Carlisle's Topographical Dictionary, vol. ii. History of the Church of Peterburgh, by Symon Gunton, folio.

PETERBOROUGH, a post-town of America, in Hillsborough county, New Hampshire; incorporated in 1760, and containing 1333 inhabitants. In this town are the most valuable grist, saw, oil, paper, and clothier's mills in the state.

PETERDORF, a town of the duchy of Stiria; four miles N.N.E. of Muckrau.

PETERERO. See PEDRERO. See GUERNSEY.

PETERHEAD, in *Geography*, a market-town and seaport in the district of Deer, and county of Aberdeen, Scotland, is seated upon a peninsula projecting into the German ocean, and connected with the mainland by an isthmus about 800 yards in breadth. It is built in the form of a cross, and is divided into four wards. The town-house, placed at the head of the principal street, is a fine building of hewn stone, surmounted by a spire upwards of an hundred feet in height. Many of the private houses are also handsome in their exterior appearance. Peterhead is a borough of barony, under the superiority of the Merchants' Maiden hospital, and is governed by a ballie and eight counsellors: the baillie is in the nomination of the superiors, and has his commission from them, but the counsellors are chosen by the feuars, at a general meeting called for that purpose. The revenue of the burgh, which is considerable, is expended in various improvements. The market day is Friday, and there are besides two annual fairs.

Peterhead occupies the most westerly point of Scotland; and lies within three hundred miles of the Naze of Norway. It is much frequented in summer as a bathing and watering place, by persons from all the principal towns in North Britain. The mineral well, called the *wine-well*, from its water sparkling like Champagne, has been long and justly held in high estimation for its medicinal qualities. The harbour is in want of improvement, and is susceptible of being rendered one of the largest and most commodious on the eastern coast. It is divided into two distinct parts, called the north and south harbour, and is defended by a small fort

mounted with eight guns. The north harbour, which is the oldest, is chiefly appropriated for the reception of the numerous fishing vessels which annually frequent the Moray Frith. Peterhead has long been a place of considerable trade, and has an extensive manufacture of thread, woollen cloth, and cotton, besides a large salt-work. Here is a respectable parochial school; also a school for writing and arithmetic, endowed by Dr. Anderson's trustees, with a salary of 20*l.* sterling. The town, with the lands in the vicinity, were formerly the property of the abbey of Deer, which was erected into a temporal lordship in 1589, in favour of Robert Keith, then commendator of Deer, by the title of lord Altree. This peerage becoming extinct in 1593, the superiority of the town became the property of earl Marischal, by whom it was constituted a burgh of barony, under the name of Keith Inch. In 1715 it was sold to an English fishing company, whose trustees transferred it to the present proprietors.

The parish of Peterhead, anciently called Peter Ugie, extends about four miles along the coast, and comprises nearly seven thousand acres of land, of which five thousand are arable, and the remainder consists of moor and moss ground. In this parish are the ruins of Old-Craig, or Raven's-Craig castle. According to the parliamentary returns of 1811, it contains 919 houses, and 4707 inhabitants. Topographical Dictionary of Scotland and the British Isles; by Nicholas Carlisle, F. S. A. 1813. Beauties of Scotland, vol. iv.

**PETERKINGEN**, a town of Switzerland, in the canton of Berne; nine miles N. of Berne.

**PETERS**, a township of America, in Franklin county, Pennsylvania; containing 1749 inhabitants.

**PETERSBACH**, a town of Bavaria, in the principality of Aichstatt; five miles N. of Aichstatt.

**PETERSBERG**, a town of the duchy of Magdeburg; 48 miles S.S.E. of Magdeburg.

**PETERSBURG**, properly St. Petersburg, in Russ *Sankt-peterbourg*, is the imperial residence of the Russian monarchs (Moscow being the ancient capital). It is situated on the shores and the islands of the Neva, standing partly on the continent in Ingria and Finland, and partly on several islands formed by the branches of that river, in N. lat. 59° 57', and E. long. 47° 49'. Its situation is pleasant, and the air salubrious. Straight, broad, and generally long streets, frequently intersecting each other at right angles, spacious open squares, variety in the elegant architecture of the houses; in short, the numerous canals, and the superb river Neva, with their substantial and sumptuous embankments, render the general view brilliant and enchanting. With regard to regularity and embellishment, no metropolis in Europe can come in competition with Petersburg. Paris, notwithstanding the multitude of its palaces, and the perpetual attention that is paid to the correction of its defective construction, can never become an elegant city; and London can only appropriate that epithet as applicable to some of its modern annexations. Berlin may vie with any other capital with regard to its handsome symmetry, but Petersburg is altogether grand and resplendent. The diameter of the city, from east to west, from the Voskresenskoi monastery, is nine versts; and from south to north, from the town fosse across Kamennoi-ostrov to the Nevka, eight versts; the circumference, taking the Vyborg side by the right bank of the Neva, measures twenty-four versts, or somewhat more than twenty English miles. Of this space, however, much must be subtracted for the water, and the land is not yet completely built upon.

Peter the Great is supposed to have had several views in

building his new city. His fondness for maritime affairs, a desire of perpetuating his name, and his dislike of Moscow, where in his younger years he had met with such a series of ill treatment, were the chief motives that induced him to lay the foundation of this seat of empire; to which some add another inducement, namely, the pleasure of mortifying the Russians, who were so obstinately attached to the city of Moscow. However that be, the beginning and increase of this great city were very extraordinary; for till the year 1703, the only buildings on the spot where this flourishing metropolis now stands were two small fishing-huts. But Peter having in that year taken the town of Nyenshants, seated on the river Neva, and made himself master of this country, its commodious situation for the Baltic trade determined him to build a town and fortress here. He immediately began to put his project in execution, calling the town after the name of his patron saint.

By the police ordinance of the year 1782, Petersburg is divided into ten precincts, each containing several quarters. The seite of these primary divisions is generally determined by the natural boundaries formed by the river and its subordinate channels. The space between the left bank of the Neva and the river Moika, is called the first admiralty quarter; between the Moika and the Katarina canal, the second; and between the Katarina canal and the Fontanka, the third admiralty quarter. The part lying beyond the Fontanka, along the Neva, is denominated the Styckhof; below the Styckhof, along the Fontanka, lies the Moskoffkoi; and along the Ligova canal, the Rojstvenskoi, to which the Yæmskoi quarter adjoins. Then follow the Vassilievskoi, the Petersburgskoi, and the Vyborgskoi.

What the quartier du palais-royal is to Paris, the first admiralty quarter is to St. Petersburg; the heart of the city, in which luxury and opulence have established their seat, diffusing themselves around with increasing energy to the remotest borders of the town; the centre of amusement and business, the brilliant resort of pleasure and fashion. Within its circuit are between twenty and thirty structures of the first magnitude, of which the imperial winter palace is the most conspicuous.

The colossal dimensions of this edifice, being five hundred English feet in length, and three hundred and fifty in breadth, the magnificence which reigns within and around it, the treasures of costly works of art and curiosities of every kind that are here collected, render it the most striking object of the city.

The exterior of this palace, which, including the hermitage, occupies the space of a small town, is imposing by its huge and ponderous mass, though not remarkable for elegance of architecture. The style and the exuberance of decoration sufficiently betray the period when it came into being. The whole height, amounting to seventy feet, comprises only a basement floor, with one grand story and an entresol. The situation of this palace is truly majestic. In front of it stands a magnificent crescent of lofty and superb edifices, forming a larger span than is to be seen in any other capital, and behind it flows the beautiful Neva within its granite banks. The left wing, to which the hermitage adjoins, has, by means of a projection, the prospect up the great Millione, one of the finest streets of the city, and on the right stands the admiralty. It was in this vast palace, raised by the empress Elizabeth, though first inhabited by Catharine II., that the latter monarch displayed through her long reign, that magnificence and liberality which made her court the admiration of foreigners, and obtained for her the just eulogiums of all literary travellers.

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It was here likewise that she ended her days on the fourth of November 1796.

The summer gardens likewise, or the principal public promenade, lie within the bounds of this admiralty quarter. By their original destination they belonged to the imperial summer palace, a spacious wooden edifice, since demolished; but are now entirely devoted to the public. They are well laid out and ornamented with fountains and statues. The balustrade by which they are entered is a truly surprising work of art; it runs in a line with the houses on the bank of the Neva, and consists of thirty-six massy columns of granite, connected together by an iron palisade of exquisite workmanship, designed and executed by a Swede. The columns are two fathoms in height, and their diameter exceeds three feet: the shafts, resting on granite pedestals of six cubic feet, and the pillars are decorated at top by a regular interchange of urns and vases. The huge masses of stone, the wonderful ingenuity displayed in the iron work, the ornaments of which are highly gilt, the connection of the whole with the superb edifices ranging at either extremity, and the view of the Neva with its noble granite quay, fill the beholder with astonishment and delight.

This quarter contains four public squares. In one of them stands the justly famous monument of Peter the Great. This statue is truly a master-piece. Falconet has succeeded in the resemblance to admiration; the features of the czar's countenance are admirably expressed. The artist represents the hero on horseback, as in the act of ascending a steep rock, the summit of which he proposes to attain. Peter is in an Asiatic dress, and crowned with laurels; he extends his right arm with graceful dignity, while with the left he holds the bridle of his horse, whose beauty of form, and elegant attitude, captivate the admiration of all spectators. The fiery courser rises on his hinder feet, and is in the attitude of stretching to attain the summit of the rock. To combine solidity with excellence was therefore a difficult task; but this the ingenious artist found a way to accomplish. The brazen serpent, which is trampled on by the horse, is emblematical, doubtless, of opposition to the views of the monarch; but it artfully serves likewise to give the proper equipoise to the statue; the point of bearing being by this means not perceived, which is the full and flowing tail of the horse gently falling on the serpent writhing with pain. The hewn rock on which it stands is a slightly mingled granite, formed of white and variegated quartz, white and red feldspath, white and black glimmer, having here and there likewise grains of iron and schorl crystals. On one side of it is this simple inscription, in letters of cast brass.

PETRU PERVOMU  
EKATERINA YTORAIA.  
LIETA 1782.

And on the side towards the senate the same in Latin:

PETRO PRIMO  
CATARINA SECUNDA.  
MDCCLXXXII.

The figure of the monarch is eleven feet in height, and that of the horse seventeen. The expence of this grand monument was truly imperial. The transport of the rock from Lachta in Finland, cost 70,000 rubles; Stephen Falconet, the statuary, received, during his nine years' stay, about 48,000 rubles; for his maintenance, 26,800 rubles; apart for the fount, 17,500 rubles; his three subordinate artificers, 27,284; the founder Chailof, 2500 rubles, besides incidental charges: the whole amounting, according to the report of the board of works, to 424,610 rubles. It was

cast in a strong building, constructed over the rock for that purpose in August 1775. It is a bell-metal of copper, with a small mixture of tin and zinc, and weighed 44,041 Russian pounds. The head of the hero was modelled by Mad. Collet, who was afterwards married to Peter Falconet, son of the statuary.

In this quarter of the town, too, is the marble palace. This superb edifice, built originally by Catharine for the mansion of Gregory Orlof, at his death reverted to the empress, and during her life-time it remained uninhabited; but her son and successor Paul, having invited Stanislaus Ponia-toffky, king of Poland, to St. Petersburg, assigned him this palace for his residence; and here, by a singular turn of fortune, he terminated his troublesome and inglorious life.

The college of foreign affairs, the post-offices, the senate, and the loan bank, are among the public structures; which, either from their magnificence, or style of architecture, deserve to be reckoned remarkable objects in this quarter of the town, and the number of which is augmented by sixteen palaces of noblemen, and a multiplicity of other beautiful and spacious buildings.

A very important rank in the topography of the same district is also maintained by the admiralty, with its lofty tower, from which it affords a view up the streets diverging from it as radii from their centre, and especially that called the Great Perspective, extending at least five miles in length. The body of the building is an oblong square, and, as is justly observed by M. Storch, remarkable for nothing so much as its ugly appearance. The side of the admiralty to the Neva occasionally presents the public with a magnificent spectacle; here being the wharf and dock-yard from whence ships of war of sixty to a hundred guns are built, and every launch is a great holiday.

The grand church dedicated to St. Isaac, which was intended by the empress Catharine II. to be the most sumptuous of all the city, was not completed in her reign. Like the marble palace, it is erected on a basement of granite, the superstructure, both within and without, being of marble, jasper, and porphyry. This church, which at the decease of Catharine had been building upwards of twenty-six years, was raised to the top of the walls, and a beginning had been made with the dome. Her successor, impatient to see the edifice completed, to the amazement of all who were not acquainted with his imperial taste, caused it to be finished of brick.

The square, contiguous to the summer-gardens, is remarkable for nothing, except the ponderous monument erected to the memory of field marshal Romanzof. The Isaac place, on which the church of that name is built, is in the form of an obtuse triangle, and is enclosed by handsome houses. The Peter's place, in which the famous statue of that monarch stands, is the grandest of all, whether we consider it in itself, or in the picture viewed from it composed of the noble river, the passing ships and boats, the thronged bridge, and the opposite shore of Vassily-ostrof, bordered by palaces, the imperial academies and sumptuous houses. In this quarter of the town originate three straight, long, and elegant streets, denominated perspectives, because from their several points of view they afford a prospect of the admiralty's gilded spire. It proceeds in a direct line, one little curvature excepted, from the admiralty to the monastery of St. Alexander Nevsky, and in breadth it may vie with the finest streets in Europe; being, according to the above-mentioned author, by one-half broader than Oxford-street, in London. Rents in this part of the town are considerably higher than in every other, and even the price

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of provisions and other necessaries is here much enhanced by the readiness wherewith the luxury of the inhabitants complies with the most exorbitant demands.

The principal public edifices of the second admiralty quarter are the court stables, the college of medicine, and the opera house. This last is a spacious massy structure in a noble simplicity of style, in the construction of which, due regard was had to the several requisites of its destination. Within the purlieus of this quarter of the town stand two of the principal Greek churches. In that dedicated to God's mother, of Kazan, containing her portrait, which is held in the highest veneration, the solemn thanksgivings for the success of public affairs are usually celebrated, at which the sovereign is occasionally present in person. The church of Nicolai, or the sailors' church, consists of two stories, whereof the lower may be heated in winter. Its five cupolas are richly gilded. The greatest curiosity of the third admiralty quarter is the bank, perhaps the most elegant building in all Petersburg. Of the churches in this quarter, only the Catholic and the Armenian are deserving of specification; both of them are rather conspicuous for the taste displayed in their structure, than for their grandeur and magnificence. The inhabitants of the two last-mentioned quarters belong chiefly to the trading classes.

Among the public buildings of the Styckhof, the arsenal is the most remarkable. It forms an open quadrangle of three stories, is built in a grand style, and wears an aspect of dignity, correspondent to its design. Facing the Styckhof road it has a magnificent portico, and the roof is ornamented with trophies and allegorical figures of excellent sculpture. Opposite the principal front, on the other side of the street, is a large square court filled with piles of cannon balls and bombs. Remarkable of itself, and from the vicissitudes it has undergone, is the edifice that was formerly the pantheon of prince Potemkin, which the empress Catharine II. afterwards purchased, and destined for her autumnal residence, denominating it the Tauridan palace. At that time, this superb edifice consisted properly of only one floor; but the body of the building, having wings extending along the street, had over the grand portal, supported upon columns, two stories surmounted with a large cupola. The left wing was greatly lengthened by the empress, by a series of additional erections, taking in one entire street, fitted up as dwellings for her retinue, orangeries, and necessary offices. She likewise changed the whole interior of the principal structure, and augmented it by the addition of a theatre. Above fifteen hundred labourers were employed in this work, which was even prosecuted during the night by the light of torches, as the empress had resolved to pass the ensuing autumn there. Dying a few years after its completion, this gorgeous palace was by her son and successor converted into barracks.

In this compartment are the imperial Italian gardens, the imperial tapestry manufactory, the foundery of cannon, the imperial brewery, and the slobode of the horse guards. Here are likewise the churches of St. Sergius and of the Preobajenskoi guards, dedicated to the transfiguration of Christ, with the church of St. Pantaleon and Simeon on the Fontanka, and the subaltern Yæger church on the Ligova canal, which is the only one of timber. The Lutheran church of St. Anne, belonging to the Germans, stands here in the third Artillery street. The Styckhof contains likewise the palaces of the princes of Wurtemberg, and on the Fontanka that of prince Sheremetof, with its spacious court ornamented with statues and a pleasure garden in the Dutch taste.

The Rojevskenskoi quarter, though comparatively small

and inconsiderable, yet contains the only monastery and the only convent within the city. The Voskresenskoi nunnery, or convent, was originally built and inhabited by the empress Elizabeth, while grand-duchess, and on her accession to the throne it was, in 1744, converted into a convent for twenty nuns. The building and walls inclose a large quadrangle, in the centre of which stands the church. Catharine II. suffered the nunnery to remain, but enlarged the structure, and founded in it a seminary for young ladies of noble families. The monastery of Alexander Nevski is built in the shape of a spread eagle, and contains in its ample bounds the palace of the metropolitan, the cells of sixty monks, five churches, a school, &c. The famous shrine of St. Alexander, composed entirely of wrought solid silver, occupies a considerable space in the elegant church erected expressly for that purpose. Beneath the pavement is the vault constructed by Catharine II. for her relics, and those of her imperial successors.

Among the public edifices of the Moskoffskoi quarter, is the imperial Yægerhof for the *corps de chasseurs*. This spacious and noble edifice was just finished at the demise of Catharine II. and her son Paul converted it into barracks. The town-hospital is likewise situated here, and deserves notice from the grandeur of its architecture.

Vassili-ostrof is the seat of commerce and of literature. The Exchange and Academy of Sciences stand on this island. The Academy of Arts also here raises its majestic front on the shore of the Neva, over-against the Galerenhof. Ascending the river, the coast is lined with the spacious edifices of the land cadet corps; and the eastern promontory of the island is decorated with the three large structures which form the Academy of Sciences, at the extremity of which appears the superb Exchange. Among the numerous churches situate on the Vassili-ostrof, the Lutheran church of St. Catharine is principally conspicuous for the neatness and simplicity of its architecture, the portico of which is from the model of the temple of Concord.

The Petersburg quarter of the town consists of several islands; and though it has no sumptuous edifices to boast of, yet contains the parent of all that exist in the imperial residence, namely, the original wooden palace or cottage of Peter the Great, over which is erected a brick building, on arches to preserve it from the inclemencies of the weather, as a sacred relic of that creative genius. These islands are Petrovskii-ostrof, which, besides a small wooden summer-house belonging to the grand duke Constantine, has nothing worth mentioning, and is partly covered with forest trees. Of the same description is the Apothecary island, which has its name from the garden upon it belonging to the medical college. Another petty island is occupied by the hemp magazines, on which account, during the summer, a numerous fleet of barks and galleots are constantly collected about it. Kammenoi-ostrof, belonging to one of the imperial family, has upon it an elegant villa, an hospital for invalids, and a number of beautiful pleasure houses. The island Yelagin, so designated from the name of its proprietor, is highly embellished by art, and laid out in walks, parterres and avenues, with plantations and shrubberies, so as to resemble the pleasure-grounds of an English nobleman. Krestovskii-ostrof, the largest of these islands, belongs to count Razumofski, and though less transformed by art, is however, by reason of its delightful prospects, arising from the noble villas and walks, and the shores of the surrounding isles, very much frequented by the inhabitants of the city. The last and greatest curiosity of this quarter is the citadel, which stands on the island in the Neva, four hundred fathoms long and half as much in breadth, near the  
Petersburg

## PETERSBURG.

Petersburg isle, a little above Vassili-ostrof, and therefore nearly opposite to the marble palace. The date of its construction is memorable in the annals of the empire, as marking at the same time the era of this city. In the year 1703, while Peter the Great was causing an earthen rampart to be thrown up on this spot, little could he foresee that the hamlet, consisting entirely of a few fishermen's huts, would within the course of a century be garnished with marble temples and gorgeous palaces. Even his rampart of mud has met with a brilliant lot, being faced on the Neva side with a magnificent quay of granite. This was the work of the empress Catharine II.

The fortrefs has two gates; one looking towards the Petersburg island, with which it has communication by a drawbridge, the other fronting the admiralty-side, to which the only access is by water. The most striking edifice within the walls is the church of St. Peter and St. Paul, which owes its origin likewise to the ductile genius of the famous czar. It stands in an open place nearly in the centre of the whole enclosure; having, contrary to the usual custom, no more than one cupola, with a tower fifty fathoms in height, furnished with a chiming clock, for which no less a sum than forty-five thousand rubles were paid by Peter the Great. From this tower the spire rises twelve fathoms, is gilt with ducat gold, and the whole presents a beautiful object from various points of view. This church contains the bones of its heroic founder, and several of his successors. Among the other curiosities of the castle are to be noted the imperial gold and silver assay offices and the mint.

Lastly, the Vyborg quarter has the most rural appearance of all; since, excepting the street along the bank of the Neva, it is entirely occupied by cottages of the peasantry, and its small population is chiefly employed in rustic labours. Notwithstanding this characteristic it however numbers amongst its buildings two noble mansions: that belonging to the late count Belborodko, standing on the Neva, has wings of colonnades, which form an amphitheatre, and has an elegant garden in the English taste. The other of these villas, remarkable for its curious style of architecture, is the property of count Stroganof, and has likewise extensive gardens. The wharf for merchantships of all descriptions, in this quarter of the town, is the last particular we shall mention.

The population of St. Petersburg is computed at 250,000 persons, consisting of Russians, Germans, Finns, French, Swedes, English, Dutch, Poles, Italians, Spaniards, Portuguese, &c. St. Petersburg is therefore a colonial city, of the motley mixture of which the Russians form by far the major part of the people, though they are not the aborigenes of the region, which the sovereigns of the Russian empire have fixed upon as their imperial residence.

The revenue which the state draws from the traffic of the city, may at present be estimated at about five millions of rubles. If to this be added the tax on the sale of houses, the contracts, &c., on the lowest probable calculation, the total will perhaps be increased by one-half.

Bread corn is brought to St. Petersburg from the countries bordering upon the Volga. Both rye and wheaten bread are eaten here; the latter is the common food of even the lowest and poorest classes. The rye-bread is well tasted and yields more nourishment. It is universally eaten, and even in families of good condition, where they have the choosng between this and the other. The poorer sort use what is called black bread, prepared of rye-meal unbolled, and is extremely nutritious.

No capital, except London, is better supplied with water than this city. The Neva, with its numerous

branches and canals, conveys it through every part of the town, so that no family can have far to fetch it. Salt is cheap; a pound being sold at a copeck, which is somewhat less than a halfpenny. Good beef is bought for four copecks the pound. Sheep, hogs, tame and wild fowl, and all sorts of game, are usually brought frozen in winter, and the price of them is generally regulated by the weather and the hardness or softness of the sledgeroads. Fish is here a very common article of consumption. The sterlet is one of the most esteemed kinds of fish, and is consequently the dearest. Of these about twenty-five thousand are every year brought alive to St. Petersburg from the Volga; which river moreover sends upwards of a million of sizeable fish of various other kinds. The town is supplied with the ordinary sorts of live fish from the Ladoga lake. Frozen, salted, and dried fish are mostly the food of the lower classes. The Neva abounds with salmon, which, however, are inferior in point of flavour to those of Riga. Cray-fish are also caught in the Neva; besides which the Volga furnishes annually about a million. Vegetables are the sole article of consumption, which the city obtains for the most part from its environs. The culture of the kitchen-garden is here brought to such perfection, that the most delicate exotics of this kind are to be had at every season of the year, and of uncommon excellence. Several of these, such as cauliflowers, asparagus, &c. are very common, and not dear. Sour cabbage, which the Russians call *schtschi*, the salutary antiscorbutic virtues of which have procured it a welcome reception also in other countries, is a daily dish of the common people; it is even served up at great tables as a national delicacy. Salted cucumbers are eaten in equal abundance, and are extremely cheap. The fruit reared in the orchards and forcing-houses in and about St. Petersburg, is not nearly adequate to the demands of taste and luxury. Fruit of the country comes from the Ukraine, and from the regions of the Volga and the Ocea; foreign fruit, especially apples, from Rostock and Stettin, to the amount of about a hundred thousand rubles annually. The first ships that arrive here in the spring, import oranges of both kinds, and lemons in such abundance, that the sale of these goods often scarcely pays the freight. A chest, containing four hundred lemons, is usually to be had, at that season, for two or three rubles. Of the ordinary liquors, *quas* is an acidulous, cooling, and wholesome beverage, peculiarly national, and is offered for sale at the corners of all the streets. (See QUAS.) In summer it is customary to cool it with ice. The juice of the cranberry yields an excellent and refreshing liquor, in very frequent use under the appellation of *klukva*. By a mixture of *klukva*, it is by no means uncommon not only to improve the *quas* and other drinks, but it is used, even in good houses, for making punch, when lemons are at a high price, or not to be had. *Sbiten* is prepared of honey and pepper boiled in water, and hawked about the town by people who make it their trade, and are therefore called *sbitenshiks*. In the public houses may be had beer, mead, and brandy. Among the more delicious sorts of national liquors, the *vishnevca* and *malinofca* must not be forgot, a sort of wine made from cherry-juice put into fermentation by sugar and brandy; *kislyjschi*, a species of *quas* of a superior quality, and several others. Their consumption, however, falls very short, when compared with that of foreign liquors. Wine, porter, and ale, are in general use. Of the first, upwards of two hundred and fifty thousand hogsheds are imported every year, and of the two last to an amount exceeding two hundred and sixty thousand rubles, the greater part of which is here consumed. The wood for  
firing

fring produced in the circumjacent district is not sufficient for the prodigious demand of this city; about a hundred and fifty thousand fathoms, mostly of birch, being annually brought in from other parts of the country.

Mr. Tooke, in his View of the Russian Empire, vol. iii. p. 543, has given us the several items of expence incurred by travellers visiting Petersburg, which are as follow: servant, *per month* 15 rubles, clothes, food. Coachman, 10 rubles *per month*, without food, but clothes provided. Cook, from 10 to 15 rubles *per month*; but a foreigner 30 or 40 rubles. Maid servant, from 3 to 5 rubles *per month*. Keep of a saddle horse, 18 rubles *per month*. A pair of coach horses, to hire, from 50 to 60 rubles *per month*, coachman included. Washing shirt, 10 copeeks; stockings, silk, 15 cop.; cotton, 5 cop.; cravat, 4 cop.; waistcoat, 10 cop.; trowsers, 15 cop.; handkerchief, 3 cop. Physician 10 rubles. Carriage to hire, 100 rubles *per month*. Lacquay, *per diem* 1 ruble; *per month* 25 rubles. Wines; the best old port 350 rubles the pipe; table port 250 rubles; chateau margot 250 rubles the hoghead; Madeira 300 rubles the hoghead; Champagne, the case 50 bottles, 200 rubles; Rhenish wine from 1 ruble 50 cop. to 3 rub. 50 cop. *per bottle*; Hungary wine from 2 rub. 50 cop. to 6 rub. the bottle. It must be understood, however, that this statement was made in the year 1800. Since that period every thing is greatly enhanced in price.

The inhabitants of this large city, besides Russians, consist of all nations; so that a person hears a great variety of languages, and sees an infinite diversity of fashions and customs at St. Petersburg. The splendour of the court is imitated by the inhabitants in general; though every thing belonging to apparel, and especially if made by foreign artizans, is very dear; and likewise furniture, and houses in an eligible situation, bear sometimes an extravagant price. The police is well regulated; and liberty of conscience is enjoyed in its utmost extent.

When a person intends to set out from hence in order to quit the country, it is necessary for him to be furnished with a pass, for obtaining which he must previously advertise his name, and intention of travelling, three times in the gazette. No sooner is the winter set in, than upwards of 3000 Russians repair with their sledges to Petersburg, where they stand in every street, and are so cheap and convenient, that few go on foot even about the town. A sledge and horse may be hired for ten copeeks an hour; and within that time this carriage will go about seven or eight English miles, the horse continually galloping. Every *isvobik*, or driver, is marked with a number on his back. It is sufficient for a stranger to know the place or the house whither he would go, and three or four Russian words, as, *stupai*, drive on; *stoi*, stop; *pramo*, straight on; *na prava*, to the right; *na leva*, to the left; and the driver will convey him safe. Most house-keepers have their own sledges and horses, and persons of distinction keep also their postilion. In summer time those who are not inclined to go on foot in this extensive city, either make use of their own carriage, which is almost of absolute necessity here, or else hire either curricles or boats.

PETERSBURG, a township of America, in New York, in Rensselaer county, E. of the village of Troy, incorporated in 1793, and containing 4322 inhabitants.—Also, a post-town of Pennsylvania, in York county, two miles N. of the Maryland line; containing a Roman Catholic church, and about 80 houses; 25 miles N.W. of Yorktown.—Also, a small town of Kentucky, situated in Woodford county, on the E. side of Kentucky river; 19 miles W.S.W. of Lexington. It has a few dwelling houses, and a tobacco ware-

house.—Also, a post-town of Virginia, of considerable trade, in Dinwiddie county, on the S.E. bank of Appamatox river, about 25 miles S. of Richmond. It contains about 400 houses, irregularly built, an episcopal church, a court house, and a gaol. The Freemasons' hall is a handsome building. It has several tobacco warehouses, stores of dry goods, and some few neat and commodious dwelling-houses. The town is a corporation; and in 1790 contained 2828 inhabitants, including 1265 slaves. Its situation is rather low and unhealthy. The whole exports of this town, valued at the usual peace prices, amount to 1,389,300 dollars, besides the value of peach and apple brandy, whiskey, &c.; 80 miles W. by N. from Norfolk. N. lat. 37° 14'. W. long. 78 8'.—Also, a very flourishing post-town of Georgia, in Albert county, in a pleasant and salubrious situation, on the point of land formed by the confluence of Broad river with the Savannah. Several respectable merchants are settled in this town; 20 miles N. by E. from Washington. N. lat. 33° 46'. W. long. 81 32'.

PETERSDORF, a town of Prussia, in the province of Samland; 24 miles E. of Königsberg.

PETERSFIELD, a town having separate jurisdiction, in the hundred of Finchdean, is situated in the county of Southampton, or Hampshire; 55 miles S.W. from London. Though but a chapelry to the parish of Buriton, Petersfield is a market and borough town of considerable antiquity. Its first charter of incorporation was granted by queen Elizabeth, who vested its government in a mayor and commonalty, and empowered them to return two members to parliament; but two returns had been previously made, one in the thirty-fifth of Edward I., the other in the time of Edward VI. The right of election, as determined by the house of commons in 1727, is "in the freeholders of lands, or ancient dwelling houses or shambles, or dwelling houses or shambles built upon ancient foundations, within the said borough." The number of votes is about 180, and the mayor is the returning officer. The regular place of worship is a chapel of ease, and near it stands an equestrian statue of William III. erected by William Jeliffe, esq. with an inscription on the pedestal.

The passage of travellers from London to Portsmouth, forms the principal support of Petersfield. It has a market on Saturday, and two annual fairs. The petty sessions are holden here. Mapledurham, about two miles south of Petersfield, was some time the seat and residence of the historian Edward Gibbon, esq. At Butser hill, a short distance from Mapledurham, Aubrey places a considerable encampment. A few miles to the west from Petersfield are the villages of East and West Meon, mentioned in the Domesday book as the property of the bishop of Winchester, and then known by the general name of Menes. In the church at East Meon is a very ancient font, bearing an exact resemblance to that in Winchester cathedral, and most probably the work of the same artist, and given by the same bishop. The upper part, or basin, is placed on a circular shaft of three large single stones, and its corners are supported on circular pillars without bases, and having capitals of plain upright leaves. Beauties of England, vol. vi.

PETERSHAGEN, formerly *Hockleve*, a town of Westphalia, in the county of Minden, and once the residence of the bishop of Minden.

PETERSHAM, a pleasant post-town of America, in Worcester county, Massachusetts, formerly called by the Indians "Nichewang;" 28 miles N.W. of Worcester. It is traversed by Swift river, a branch of Chickapee river. The soil is rich, and here are large and excellent orchards; it contains 1794 inhabitants,

PETERSHAUSEN, a princely Benedictine abbey, near Constance, on a branch of the lake; given in 1802, with the diocese of Constance, as an indemnity to the margrave of Baden.

PETERSKIRCHEN, a town of Austria; five miles N. of Senneberg.

PETERSTHAL, Str., a town of Germany, in the circle of the Upper Rhine; six miles S. of Oppenau.

PETERSWÄLD, a town of Bohemia, in the circle of Leitmeritz; 18 miles N.N.W. of Leitmeritz.

PETERSWALDAU, a town of Silesia, in the principality of Schweidnitz; nine miles S. of Schweidnitz.

PETER-WARDEIN, a town of Sclavonia, on the Danube, strongly fortified; famous for the victory obtained near it over the Turks, in 1716, by prince Eugene; 38 miles N.W. of Belgrade. N. lat. 45 26. E. long. 19 37.

PETESIA, in *Botany*, a name of whose origin neither Browne nor Linnæus has vouchsafed to give any account, nor has any other writer, that we can find, hazarded a conjecture concerning it. We are obliged to leave it in the dark, as we find it. Browne Jam. 143. Linn. Gen. 54. Schreb. 72. Willd. Sp. Pl. v. 1. 612. Mart. Mill. Dict. v. 3. Juss. 199.—Class and order, *Tetrandria Monogynia*, Nat. Ord. *Rubiaceæ*, Juss.

Gen. Ch. *Cal.* Perianth superior, in four or five deep, acute, permanent segments. *Cor.* of one petal, funnel-shaped; its limb in four deep segments. *Stam.* Filaments four, short, inserted into the base of the corolla; anthers oblong, equal to the tube. *Pist.* Germen inferior, roundish, with a furrow at each side; style simple, erect; stigma acute. *Peric.* Berry globose, of two cells, crowned with the calyx, and finally splitting longitudinally. *Seeds* solitary in each cell, large, convex on the outside, flat on the inner.

Eff. Ch. Corolla of one petal, funnel-shaped, four-cleft. Stigma simple, acute. Berry with two seeds.

Obs. The character of this genus is involved in the greatest possible confusion. We have endeavoured to make it accord with *P. stipularis*, the only authentic species that remains, and to avoid absurd contradictions. Probably *Isora americana* ought to be restored to *Petesia*, where Browne first placed it, and with which it agrees far better in habit and character than with other *Isora*; but who can decide this point without examining all the plants in question in a perfect state? Whether *P. stipularis* be tetrandrous or pentandrous is not clear, nor does Browne, whose specimens are before us, appear to have seen the flowers. For *P. Lygislum* of Linnæus, see MANETTIA.

1. *P. stipularis*. Linn. Sp. Pl. 160. Willd. n. 1. (*P. fruticosa*, foliis ovatis oppositis, stipulis rigidis interpositis, racemis minoribus alaribus, calyce quinquefido; Browne Jam. 143. t. 2. f. 2.)—Leaves elliptic-lanceolate, most downy beneath. Panicles axillary, dense, forked.—Native of Jamaica, on the hills above Bull Bay, and on those between Sixteen-mile-Walk and St. Mary's. *Browne*. The stem is shrubby. Young branches square, leafy, clothed with soft down, as are the footstalks, backs of the leaves, and whole inflorescence. The leaves are two inches long, elliptical, acute, entire, with one rib, and many transverse curved veins; their upper surface at length smooth and naked. Stipules between the bases of the footstalks, broad at the bottom, pointed, bristly. Panicles much shorter than the leaves, each of twelve or fifteen small flowers. Berry downy, about the size of hemp-seed. Swartz guesses this plant to be akin to *Rondeletia*, but he had never seen it. See his Obs. Bot. 47.

2. *P. carnea*. Forst. Prodr. 10. Willd. n. 2.—“Leaves

oblong-lanceolate, smooth. Cymes terminal, three-cleft.”—Native of the island of Namoka. *Forst.* We must rely on Forster for the genus of this plant.

3. *P. tomentosa*. Jacq. Amer. 18. Linn. Sp. Pl. 161. Willd. n. 3.—“Leaves oblong, downy on both sides.”—Observed by Jacquin, in woods at Carthage. A shrub, with weak trailing branches; the young ones obscurely quadrangular, and slightly downy. Leaves oblong, tapering at each end, three inches long, soft with scarcely visible down. Corymbs lateral and terminal. Flowers small, inodorous, yellowish-white. Fruit unobserved, so that Jacquin was in doubt as to the genus. We should not be surprized if this proved the very same plant as *P. stipularis*.

4. *P. villosa*. (*P. fruticosa*, foliis subvillosis ovatis oppositis, stipulis fetâ terminatis, racemis alaribus; Browne Jam. 144.)—“Leaves ovate, somewhat villous. Stipules tipped with a bristle.”—Gathered by Browne along with the first species. He gives no figure of it, nor have we seen a specimen. We merely insert it for further enquiry.

*P. spicata*, Swartz Ind. Occ. 1945, having numerous seeds and a cloven stigma, cannot belong to this genus, nor dare we adopt Loureiro's *simplicissima* and *trifida*.

PETHERTON, NORTH, in *Geography*, a town in the hundred of North Petherton, in Somersetshire, 144 miles W. by S. from London. The town consists chiefly of one street, which is built along the road from Bridgewater to Taunton, and contains many good houses. It derives its name from its situation on the river Parret, which was anciently written Peder. It was formerly in the possession of the Saxon kings, and of such consequence, that it never was assessed to the Danegeld, nor rated to any other subsidy. The parish is extensive, and contains several hamlets. The church is dedicated to St. Mary, and is a large handsome structure, consisting of a nave, chancel, and side aisles. At the west end is an embattled tower, richly embellished with sculpture, and open ornaments towards the summit. The pinnacles are particularly light and elegant. The market is on Saturday, and there was formerly a large market-place for corn. Here is one annual fair. By the census of 1811, the number of houses was 546, and of inhabitants 2615. Within the parish are several places, of little note now, but which at former periods have been the residence of great and eminent families. Manfel, or Maunfel, is the seat of John Slade, esq., the possessor of the manor and hundred of North Petherton. This estate had been the inheritance of the family of the Maunfels for many generations. Collinson's History of Somersetshire, vol. iii.

PETHERTON, SOUTH, a town in the hundred of South Petherton, Somersetshire, 137 miles from London, and six from Ilminster. It was formerly called Pedredan, or Pedredstown, from its situation on the Parret. It is the first considerable parish which that stream traverses in its way to the sea. It passes here under a stone bridge of three arches, a mile southward of the parish church, at the intersection of the Roman fosse-road, coming from Ilchester. The bridge was formerly of wood, which having become ruinous, two children were drowned in the river near it; the parents of the children rebuilt it of stone, and caused their infant effigies to be placed thereon, to commemorate the circumstance. In a field near this bridge a large quantity of Roman coins, to the amount of six pecks, was dug up about the year 1720; and near Jailer's-mill, in the tithing of Southarp, a little below the surface of the ground, are the remains of Roman buildings, which the common people, from the name, suppose to be the foundation of an old prison. In this spot, also, coins, fragments

of urns, pateræ, and pieces of terras, have been discovered. It is undisputed that South Petherton and its vicinity were known to, and occupied by, the Roman people, as it lies so near to one of their principal roads, and as their reliques have here been so frequently discovered. At Watergore, a small hamlet southward of the town, a Roman pavement was discovered in 1673; and Wigborough, not far distant, is supposed to have been a Roman town, not only from its name, but from the extensive foundations of buildings which have been traced there.

When that people relinquished this country, South Petherton became the possession and the seat of the Saxon kings of Wessex. King Ina had a palace here, which was long ago destroyed; there is, however, an old house near the church, with ancient windows, and armorial shields, which bear that prince's name, but it is unquestionably the erection of more modern times. King Athelstan is reported to have occupied this place, which was thought an object of importance by all his successors, till after the Norman conquest. The parish church stands on a little eminence near the centre of the town, and is dedicated to St. Peter and St. Paul. It is a large structure, built in the form of a cross, having two side aisles, and a north and south transept, with an octangular tower at their intersection, crowned with a spire. Behind the altar is a vestry-room, which was formerly a confessional: many of the monuments, with the organ, were spoiled in the civil wars. The parish is divided into four tithings. A market is held here on Thursday, and there was formerly a large market-hall and cross, both which, with several houses, were destroyed in the last century. The annual fair is on the fifth day of July. At this place is a considerable manufactory of dowlas. By the census of 1811, the parish contained 352 houses, and a population of 1867 inhabitants. At Hinton St. George, about three miles distant, is a seat of earl Poulet. Collinson's History of Somersetshire, vol. iii.

PETIA, a word used by medical writers in different senses. It is commonly understood to mean a piece of rag, used to tie medicinal ingredients in, to be used by infusion in liquors; but *petia oculi* signifies an hæmorrhage of the eye.

PETICULÆ, the same as *petechia*, purple spots appearing on the flesh in malignant fevers.

PETIGLIANO, in *Geography*, a town of Etruria; 50 miles S.E. of Sienna.

PETIGO, a word used by some authors for *impetigo*.

PETILUM, in *Botany*, a name given by Linnæus, in the first edition of his *Genera Plantarum*, p. 91, to the Crown Imperial, which he at that time considered as a distinct genus from *Fritillaria*; see that article.

PETILIUS FLOS, a name used by some botanical authors for the African marygold.

PETIMBUABA, in *Ichthyology*, the name of a fish caught in the American seas, and called by some, in English, the *tobacco-pipe fish*. See *Fistularia*.

PETIN, in *Geography*, a small island in the East Indian sea. S. lat. 2° 20'. E. long. 99° 27'.

PETINA, LA, a town of Naples, in Principato Citra; 6 miles S.W. of Cagliano.

PETIOLATE LEAF, in *Botany*. See *Leaf*.

PETIOLUS, the Footstalk, or Leafstalk, is what supports the leaf when the latter is not sessile, or close to the stem or root. In all simple leaves, and in some compound ones, whose leaflets are sessile, the footstalk is necessarily simple: in compound leaves in general it is branched. The footstalk is usually channelled on the upper side; convex, angular, or keeled underneath. Sometimes it is di-

lated, and concave, or sheathing at the base. It occasionally ends in tendrils, as in some Vetches, and now and then bears the flower-stalk, as in *Turnera* and *Menyanthes*. See *Leaf*.

PETIS DE LA CROIX, FRANCIS, in *Biography*, a learned French orientalist, born in 1654, was the son of the king's interpreter for the oriental languages, and received an education to qualify him for the same employment. At the early age of sixteen, he was sent by the minister Colbert to reside in the East. He passed several years at Aleppo, visited Ispahan and Constantinople, and employed himself in the most diligent study of oriental literature. He returned to Paris in 1680, and in two years afterwards he was sent to Morocco, as secretary under M. de Saint-Amand, to Muley Ishmael, king of that country. He pronounced before that sovereign the ambassador's harangue in Arabic, with an elegance and purity which excited the admiration of the whole court. In the two following years he accompanied the French armament against Algiers, in quality of secretary-interpreter of the marine, and was employed to translate into the Turkish language the treaty of peace in 1684. He performed the same office with respect to the negociations with Tunis and Tripoli. When the latter power was engaged to pay the king of France the sum of 600,000 livres, by way of reimbursement, a considerable bribe was offered to Petis de la Croix, to put in the treaty crowns of Tripoli instead of French crowns, which would have made the difference of 100,000 livres, but his fidelity to his sovereign was incorruptible. In 1687 he was employed at Morocco under the duke de Mortemar: and, in short, it was through his intervention that all the affairs between the French ministry and the eastern courts were transacted, from the year 1680 to the time of his death. In 1692 he was appointed to the professorship of Arabic in the college royal, and the survivorship of his father's office of Oriental interpreter was conferred upon him. From this period he never left the kingdom, but employed himself in translations from the eastern languages, of which he was acquainted with the Arabic, Turkish, Persian, Tartarian, Ethiopic, and Armenian. He died at Paris in 1713. His principal publications are "The Oriental Library of Hadji Calfa;" "The History of all the Mahometan Monarchies," from the Turkish; "General State of the Ottoman Empire, from the Foundation to the present Time, with abridged Lives of the Emperors;" from the Turkish; "The History of Gengiscan;" "The History of Timur-Bec," from the Persian; "The Thousand and One Days," tales from the Persian; besides other tracts, geographical and descriptive, and some grammars, dictionaries, &c. Moreri.

PETISTAGUIT, in *Geography*, a river of Canada, which runs into the river St. Lawrence, N. lat 50. W. long. 66 26'.

PETIT, SAMUEL, in *Biography*, a French Protestant divine, was born in the year 1594. He was the son of a respectable minister at Nismes, in Languedoc, from whom he received the elements of an excellent education. While a child, he discovered a powerful inclination for learning, and astonished the masters under whose tuition he was placed, by the rapidity with which he became a proficient in the Greek and Latin languages. Having laid a good foundation of grammar learning, he continued to extend his acquaintance with the ancient languages, and afterward to apply his attention to rhetoric and philosophy. Being intended for the ministry, he spent three years at Geneva in attending the divinity lectures of Diodati, and those of the other learned professors of that celebrated school. At the same time

time he applied himself to the study of the oriental tongues. The zeal with which he applied to learning is almost incredible: for a whole year he allowed himself rest only on each alternate night, the others were devoted to study. Such was his progress, that at the age of seventeen he was admitted to the ministry. Almost immediately after this he was chosen to fill the chair of professor of divinity in the academy of Nîmes, to which was added the professorship of the Greek and Hebrew languages. These posts he retained with very high reputation during the remainder of his life; while he pursued his various learned studies with uncommon diligence. He was likewise eminent as a preacher, and devoted much of his time to the charitable duties of visiting the sick. To the deep regret of all who knew him, and to the loss of the learned world, he died in 1643, when he was only in the 49th year of his age. He was a man of vast and profound erudition, but his learning was accompanied with modesty and humility, and through life he is said to have exhibited a bright pattern of unaffected piety, and of all the moral virtues. His works are very numerous, and he left behind him in MS. two large volumes of notes upon Josephus, which were purchased by lord Clarendon for 150 louis-d'ors, and presented to the university of Oxford, where they were deposited in the Bodleian library. Here they were consulted by Hudson, when he was preparing his edition of the Jewish historian. Moreri.

PETIT, PETER, a celebrated French mathematician and natural philosopher, was born in the year 1598. He cultivated from a very early period the study of the mathematics and physics, in which he made considerable progress, and which recommended him to the acquaintance of M. Pascal. His father was comptroller of the elections in the district in which he lived, an office to which he succeeded, but which, in 1633, he sold, and removed to Paris. Here he distinguished himself by his writings, and became intimate with the most eminent men of his time. On several occasions he was employed by cardinal Richelieu, who gave him a commission to visit the sea-ports, with the title of engineer and géographe to the king. He was afterwards sent into Italy by his majesty, on special affairs. After his return, he became a convert to the principles of Des Cartes. About the year 1640, he received the appointment of intendant of the fortifications of France. During a part of the year 1646 and 7, he was stationed at Rouen, where, in conjunction with M. Pascal, he went through the same experiments on the subject of a vacuum, which Torricelli had made before in Italy. (See PASCAL.) From this time there are no farther particulars relating to the life of M. Petit, though he lived to the year 1677, when he was about 79 years of age. He is described as having excelled particularly in astronomy, and as having had a singular passion for experimental philosophy. He was author of many treatises on mathematical, physical, and astronomical subjects, of which a long list is given in the Gen. Biog. Moreri.

PETIT, PETER, a learned physician, was born at Paris in the year 1617, and obtained the degree of doctor in the university of Montpellier, and of bachelor of medicine in that of Paris. He was also elected a member of the academy of Padua. Although he had acquired an extensive acquaintance with the medical science, in the course of the studies by which those degrees were obtained, yet the bias of his mind was not directed to the practice of the profession which he had cultivated, but led him to philosophical and literary pursuits, and especially to the study of history, and to the cultivation of Latin poetry. It was by the excellence of his poems that he obtained the honour of admission into the Paduan academy; and the same merit oc-

casioned him to be ranked as one of the Pleiades of Paris, an appellation given to a party of seven of the most accomplished Latin poets of that capital. A collection of his poems was published in 1683, dedicated to M. Nicolai, president of the chamber of accounts, and prefaced by a curious dissertation on the mania of poetry. His poem of "Codrus," and that entitled "Cynomagie," are much praised for the elevated sentiments, the elegance of expression, and the strength and harmony of the verse, which they exhibit. One of his poems was on the subject of "Tea," and was printed at Leipzig, in 1685, with the title of "Thée, sive de Sinenſi Herba Thée," with an epigraph of Nicholas Pechlin respecting this herb, and the descriptions of several other authors. The writings of Petit, however, were not limited to poetical essays; he was the author of several curious tracts, of which the following are the titles. "De Motu Animalium Spontaneo," Par. 1660, in which he defended Aristotle against Descartes: "De Lacrymis, Libri tres," 1661, 12mo.: "Exercitationum de Ignis et Lucis Natura Defensio," 1664, 4to.: "Dissertatio de novâ Renati Carleſii Philoſophia," 1670, 8vo.: "Miscellaneous Observationum, Libri quatuor," 1682, 8vo.: "De Amazonibus Dissertatio," 1685, 12mo.: "De Sybilla, Libri tres," Lips. 1686, 8vo.: "De Natura et Moribus Anthropophagorum," Traj. 1688, 8vo.: "Homeri Nephthes, sive, de Helenæ Medicamento luctum volente Dissertatio," ibid. 1689, 8vo.: "Commentarii in tres priores Aræti Cappadocis Libros," Lond. 1726: "Traité de la Nourriture qui peut se tirer de l'Eau." Eloy Dict. Hist. de la Med.

PETIT, FRANCIS, a distinguished physician, who is better known by this name than by that of *Pourfour du Petit*, was born at Paris on the 24th of June, 1664, and lost his parents, who were engaged in trade, during his childhood. He is said to have been slow of apprehension, and weak in memory, when a boy; so that, though he laboured much at school, his progress was extremely slow, until his mind was interested, and his faculties called forth, by the philosophy of Descartes, which his tutor put into his hands. The subject became the leading object of his pursuits, and he began his travels early, with the view of increasing his knowledge. At Rochelle he became intimate with M. Blondin, who had a valuable library, a garden of medicinal plants, and a museum of natural curiosities, and who instructed him in anatomy, and recommended him to study medicine. He adopted this counsel, and in 1687 repaired to Montpellier, where he graduated, and returned to Paris in 1690. Here he studied anatomy under Du Verney, botany with Tournefort, and chemistry with Lemery, and obtained the friendship of these celebrated men. After three years of study, and attendance on the hospital of La Charité, he became attached to the army, and in his superintendance of the hospitals at Mons, Namur, and Dinant, he obtained considerable distinction, and established in them dissecting-rooms, and chemical laboratories, and directed the studies of the pupils in botany. After the peace of Ryfwick, in 1697, he returned to Paris: but the war of the Spanish succession called him again to the military hospitals, and it was not till the peace of Utrecht took place, in 1713, that he settled in Paris. In 1722 he was elected a member of the Academy of Sciences, and three years afterwards he was appointed pensionary anatomist, on the superannuation of M. du Verney. His reputation obtained for him this honourable appointment, and he was now extensively employed in the practice of his profession. He was particularly successful in the treatment of diseases of the eye, which he illustrated by various models, and remed-

died by improving the instruments and operations of his predecessors, in relation to this delicate organ.

This ingenious man died at Paris on the 18th of June, 1741, aged 77. He left several works behind, besides the papers which he communicated to the academy. They were written in a negligent, and not always correct style; for the constant occupation of his time in observation and experiment prevented him from exercising the *limæ labor* on his writings, and rendered him careless about the turn of his phrases. His works are; "Trois Lettres d'un Medecin des Hospitaux du Roi à un autre Medecin de ses Amis, sur un Nouveau Systeme du Cerveau," Namur, 1710, 4to. "Dissertation sur une Nouvelle Methode de faire l'Operation de la Cataracte," Par. 1727, 12mo. "Lettre dans laquelle il est démontré que la Crystallin est fort près de l'Uvée, et ou l'on rapporte de nouvelles preuves de l'Operation de la Cataracte," 1729, 4to. "Lettres contenant des Reflexions sur ce que M. Hecquet, M.D. a fait imprimer touchant les Maladies des Yeux," 1729, 4to. "Lettres contenant des Reflexions sur les Decouvertes faites sur les Yeux," 1732, 4to. Eloy Dict. Hist.

PETIT, JOHN LEWIS, a celebrated surgeon, was born of a respectable family at Paris, on the 13th of March, 1674. From his childhood he displayed an acuteness and penetration beyond his years, which gained him the attachment of M. de Littre, a celebrated anatomist, who resided in his father's house. This kindness of M. de Littre, and his own curiosity, sometimes attracted the boy to the dissecting room of the former, where he soon evinced an interest in anatomical pursuits. Dissection, so far from alarming him, became his play: he was found one day, in a garret, where he had secreted himself, dissecting a rabbit, which he had caught, in imitation of what he had seen M. de Littre perform. This able anatomist did not fail to cultivate this inclination; and from the age of seven years, his young pupil regularly attended at his demonstrations, and made such rapid progress, that he had scarcely attained the age of twelve, when M. de Littre confided to him the superintendance of his anatomical theatre. He afterwards studied surgery under Castet and Marechal, and was admitted Master at Paris in 1700. He was born, it has been said, for the art which he practised, and would have created surgery, if it had been previously unknown. He became the first practitioner, and, as it were, the oracle of surgery in Paris; he was consulted in all cases of importance; and there were few operations of difficulty and delicacy, which he did not superintend, or actually perform; and his hand and his counsels were alike successful. Such a reputation was of course not limited to his native city, but extended throughout Europe. In 1726 he was sent for by the king of Poland, and again in 1734 by Don Ferdinand, afterwards king of Spain: he re-established the health of both these princes, who endeavoured to retain him near their persons with the offer of great rewards. But he preferred his native capital to the most brilliant situations, and found there a sufficient number of persons who properly estimated his merits. He became a member of the Academy of Sciences in 1715, and was appointed director of the academy of surgery, and censor and royal professor at the schools. He was likewise chosen fellow of the Royal Society of London. He died at Paris on the 20th of April, 1750, aged 76. He was equally beloved for the qualities of his heart, as he was admired for those of his understanding; for his disposition was naturally lively and hospitable, and his manners were indicative of openness and warmth of heart, rather than the result of a studied politeness. He was extremely animated in every thing that concerned his

profession; and an oversight irritated him more than an insult. But his anger was ever of short duration, and he entertained no enmities. His benevolence towards the suffering poor was unbounded, and he spared no labour or exertions for their relief.

He communicated many memoirs to the Academy of Sciences, and several to the Academy of Surgery, which were printed in their first volume. His only separate publication was, his "Traité des Maladies des Os," printed at Paris in 1705, in 12mo., and frequently reprinted, with additions. An edition, in 1758, in two volumes, 12mo., was published by M. Ant. Louis, with an historical and critical essay respecting it subjoined: and his pupil, M. Lesne, published his posthumous works in 1774, with the title of "Traité des Maladies Chirurgicales et des Operations qui leur conviennent," in three volumes, 8vo., with many plates of surgical instruments. His treatise on the bones involved him in several controversies; but the only chagrin which he felt, arose from finding Winslow, who, as censor royal, had approved the work, retract his approbation, in a letter inserted in the Journal des Savans for May, 1725. Eloy Dict. Hist.

PETIT, ANTHONY, a distinguished anatomist, was born at Orleans, and received the degree of doctor of physic at Paris, in November 1746. He was elected a member of the Royal Academy of Sciences in 1760. His talents in the practice of his profession procured for him the appointment of inspector of military hospitals in 1768, and, in the following year, the chair of anatomy and surgery at the king's garden, where his science and eloquence attracted a crowd of auditors. In 1775 he was succeeded by M. Vicq d'Azyr in the duties of this chair, while he remained titular professor. He was author of the following works; *viz.* "Lettre d'un Medecin de Montpellier, au Sujet de l'examen public que le Sieur Louis a subi à saint Côme, en 1749, pour servir d'Eclaircissement à ce qu'en dit M. Fréron," 4to. 1749. "Discours sur la Chirurgie," an introductory lecture delivered at the schools of medicine, 1757. "Consultation en faveur des Naissances tardives," 1764, 8vo. "Premier et seconde Rapport en faveur de l'Inoculation," 1766, 8vo. "Deux Consultations Medico-legales," relative to a case of supposed self-murder, and to a supposed infanticide, 1767. He also edited, "Anatomie Chirurgicale publiée eidevant par Jean Palin," 2 tom. 8vo. 1753. Eloy Dict. Hist. de la Med.

PETIT, *Cape, Jury, Larceny, Serjeanty, Session, Treason.* See the substantives.

PETIT *Goave*, in *Geography*. See GOAVE.

PETIT *Port*, a harbour on the coast of Peru, near the equator.

PETITA TERRA. See SUMMONS.

PETITCODIAK, in *Geography*, a river of America, which falls into an arm of the bay of Fundy, called Chegnecto channel. The Indians have a communication from the head of it with St. John's river, by a portage across to the head of Kennebecus.

PETITE GUERRE, Fr., in *Military Language*, is carried on by a light party, commanded by an expert partisan, consisting of between one and two thousand men, separated from the main army, in order to secure the camp on a march, to reconnoitre the enemy or the country, to seize their posts, convoys, or escorts, to plant ambuscades, and to practise every stratagem for surprising or disturbing the enemy.

PETITE-PIERRE, LA, or LUTZELSTEIN, in *Geography*, a town of France, in the department of the Lower Rhine, and chief place of a canton, in the district of Sa-

vare. The place contains 1019, and the canton 9323 inhabitants, on a territory of 292½ kilometres, in 22 communes.

PETITE-RIVIERE, a town of Hispaniola; 15 miles E.N.E. of St. Marco.—Also, a town of Canada, on the St. Lawrence; 65 miles N.E. of Quebec.

PETITES-CHIELLES, a town of France, in the department of the Jura, and chief place of a canton, in the district of Saint Claude. The place contains 578, and the canton 11,923 inhabitants, on a territory of 255 kilometres, in 28 communes.

PETITE-TERRE, a small island in the West Indies, near Defeada.

PETITE-TROU, a town of the island of Hispaniola; 19 miles E. of Jeremie.

PETITIA, in *Botany*, was named by Jacquin, in honour of Francis Pourfour du Petit, a celebrated physician and anatomist of Paris, who died in 1741. He published some botanical observations, in the form of letters, in 1710. Jacq. Amer. 14. Schreb. 72. Willd. Sp. Pl. v. 1. 614. Mart. Mill. Dict. v. 3. Juss. 107.—Class and order, *Tetrandria Monogynia*. Nat. Ord. *Personate*, Linn. *Vitices*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, small, erect, with four teeth, permanent. *Cor.* of one petal; tube cylindrical, erect, long; limb in four ovate, acute, flat, reflexed segments, half the length of the tube. *Stam.* Filaments four, awl-shaped, very short, in the upper part of the tube; anthers erect. *Pist.* Germen roundish, small, superior; style awl-shaped, erect, the length of the stamens; stigma simple. *Peric.* Drupa roundish. *Seed.* Nut ovate, obtuse, of two cells, with solitary, oblong kernels.

Eff. Ch. Calyx four-toothed, inferior. Limb of the corolla four-cleft, reflexed. Drupa with a nut of two cells.

Obs. Jacquin says the flowers are often three-cleft and triandrous.

1. *P. domingensis*. Jacq. Amer. t. 182. f. 6, a leaf only.—Native of woods in Hispaniola. An upright *shrub*, whose young *branches* are square and furrowed. *Leaves* opposite, ovate-oblong, pointed, smooth, entire, veiny underneath, six inches long, on slender *footstalks*. *Panicles* axillary, three inches long, with awl-shaped *bracteas* at their subdivisions. *Flowers* numerous, white.

Dr. Mærtner, whose discoveries, though not acknowledged, have so greatly enriched the Vienna gardens, has observed to us that this plant is truly a species of *Citharexylum*; nor do we see any reason to doubt the accuracy of this opinion, though, having never seen a specimen, we cannot form any positive conclusion.

PETITIO INDUCIARUM, in the *Civil Law*, the same as impanance in common law.

PETITIO Principii, in *Logic*, a begging the question, or precarious supposing a thing to be true, or taking it for granted, when it really remains either dubious, or else expressly denied.

PETITION, PETITIO, a supplication in form, made by an inferior to his superior; especially to one having some jurisdiction.

To subscribe a petition to the king to frighten him into change of his measures, intimating, that if he denied, many thousands of his subjects will be discontented, &c. is included among the contempts against the king's person and government, tending to weaken the same, and is punishable by fine and imprisonment. 1 Hawk. P. C. 60.

The right of petition is, however, unquestionable; provided care be taken, that, under the pretence of petitioning,

the subject be not guilty of any riots or tumults, for preventing which, it is provided by the stat. 13 Car. II. stat. 1. cap. 5, that no petition to the king, or either house of parliament, for any alterations in church or state, shall be signed by above twenty persons, unless the matter thereof be approved by three justices of the peace, or the major part of the grand jury, in the country; and in London, by the lord mayor, aldermen, and common council: nor shall any petition be presented by more than ten persons at a time, on pain, in either case, of incurring a penalty not exceeding 100*l.* and three months imprisonment. But, under these regulations, it is declared by the statute 1 W. & M. stat. 2. cap. 2, that the subject hath a right to petition; and that all commitments and prosecutions for such petitioning are illegal.

PETITION of *Appeal* to the house of lords is the dernier resort of any subject, who thinks himself aggrieved by any interlocutory order or final determination in the court of chancery. This jurisdiction of the house of peers is said to have begun in 18 Jac. I., and the first petition, which appears in the records of parliament, was presented in that year; and the first that was heard and determined, was presented in a few months after; both levelled against the lord keeper Bacon, for corruption and other misbehaviour. It was afterwards warmly controverted by the house of commons, in the reign of Charles II. But the dispute has long since terminated. We may observe, that no new evidence is admitted in the house of lords, upon any account, for this is a distinct jurisdiction.

PETITION of *Bankruptcy*, is a petition presented to the lord chancellor by one creditor to the amount of 100*l.*, by two to the amount of 150*l.*, or by three or more to the amount of 200*l.*; upon which he grants a commission to certain persons, who are then styled commissioners of bankrupts. See COMMISSION.

PETITION of *Right*, was a parliamentary declaration of the liberties of the people, assented to by king Charles I., in the beginning of his reign: in which it is enacted, that none should be compelled to make or yield any gift, loan, benevolence, tax, and such like charge, without consent by act of parliament; nor upon refusal so to do, be called to make answer, take any oath not warranted by law, give attendance, or be confined, or otherwise molested concerning the same, &c. And that the subject should not be burthened by the quartering of soldiers or mariners; and all commissions for proceeding by martial law to be annulled, and none of like nature issued thereafter, lest the subject (by colour thereof) be destroyed or put to death, contrary to the laws of the land, &c. See stat. 3 Car. I. cap. 1.

PETITOT, JOHN, in *Biography*, was an enamel painter of very considerable renown, born at Geneva in 1607, who practised for a considerable length of time in England, being assisted, it is said, in the manufactory of his colours, by fir Theodore Mayerne, a physician and renowned chemist.

Petitot copied many of Vandyke's pictures with great neatness and care; but though his colours were specifically pure and bright, he possessed not the art of breaking and uniting them; and consequently his pictures lack richness, truth, and harmony. He was nevertheless the first man of his time, in that branch of the art. From England, after the execution of Charles, he went to France, and succeeded at the court there, so as to acquire an ample fortune. Being a Protestant, he with some difficulty, after the passing of the edict of Nantes, procured permission to retire to Geneva; and afterwards settled at Vevay, in the canton of Berne, in ease and affluence; and there he died at the advanced age of 84, in 1691.

The usual price of Petitot for a portrait was 30 pistoles; but for some years before his death, it was advanced to 40. But he only painted the heads and hands of his figures; the hair, ground, and draperies, being executed by his brother-in-law, Bordier; and it appears to their credit, that they associated and lived together for 50 years, without the smallest contest or misunderstanding.

He left a son of his own name, who practised the same profession with his father; and though he was not by any means equal to him, yet he obtained very considerable employment and repute. His age and the period of his death are alike unknown.

PETIVARS, in *Geography*, a tribe, inhabiting towards the north-east of Brasil, who are said to be benevolent and hospitable. They bore their lips, and adorn them with a green stone, of which they are so vain as to despise all other nations. When the wife has brought forth a child, the husband confines himself to his bed for a month, and receives visits of congratulation. Estalla observes, that this custom is not only common in many parts of America, but was also known to the ancient Spaniards, as mentioned by Strabo. The reason of this custom is, that if any accident were to befall the father, the new-born babe must suffer.

PETIVER, JAMES, in *Biography*, an English naturalist and indefatigable collector, who flourished at the end of the 17th and beginning of the 18th centuries, passed the chief part of his life as an apothecary, at the White Cross in Aldersgate-street, London. Of his origin nothing is known, and the only indication we can find of his family connections, occurs in the octavo edition of his *Gazophylacium*, p. 15, where he says, "this serpent, with several other animals, I find amongst some Cape paintings, which our worthy kinsman Dr. Sherard hath lately given me to figure," &c. It were unjust to defraud him of even the shadow of so illustrious a relationship. Dr. Pulteney has ascertained that Petiver was apprenticed to Mr. Feltham, apothecary to St. Bartholomew's hospital, and that after he was established for himself in Aldersgate-street, he became apothecary to the Charter-house, and obtained a considerable share of practice in his profession. He had an early propensity to collect natural curiosities, and engaged various captains and surgeons of ships to bring home any thing they could find to enrich his growing museum. He supplied such persons with printed lists, and indications, of what was best worth their notice, as well as with instructions for preserving what they might collect. Nor was he less industrious in procuring the productions of his own country. He travelled in 1692 into the midland counties of England, nor did he confine his inquiries to the beaten tracks, but extended them to the cryptogamic walks of Botany, hitherto scarcely explored. His subsequent publications shew that he was in the daily habit of observing the minutest productions of the animal as well as vegetable kingdoms, in the neighbourhood of London. His museum and his reputation gradually increased, insomuch that Sir Hans Sloane, some time before Petiver's death, offered him four thousand pounds for the former, and afterwards purchased it; while the latter is evinced by his being elected a Fellow of the Royal Society, and still more by his being acknowledged as the liberal and intelligent correspondent and assistant of the great Mr. Ray. He proved no idle member of the learned body which adopted him. Above twenty of his papers appear in the Philosophical Transactions, between the years 1697 and 1717. These are mostly accounts of various productions of the three kingdoms of nature, sent to the author from distant countries. One of his treatises however has a higher aim, and entitles him to rank as a

philosophical naturalist. This occurs in vol. xxi. N<sup>o</sup> 255, under the denomination of "Some attempts made to prove, that herbs of the same make, or class, for the generality, have the like vertue, and tendency to work the same effects." The idea had indeed been suggested by Cæsalpinus, but it was first exemplified by Petiver. Linnæus afterwards carried it further, nor can any reflecting person doubt of the soundness of the doctrine.

The first publication of our author was a small octavo of 96 pages, with two plates, entitled *Musei Petiveriani Centuria decem*; 1695—1703. This is more than a bare catalogue of his collection, as many of the articles are scientifically defined, and accompanied with brief but intelligent remarks. Copious accounts of his correspondents and benefactors are interspersed. An invidious mention of his contemporary, and rival collector, Plukenet, occurs in p. 78, where that botanist is accused of "rash conjectures" and "false references," and of refusing to compare some of Petiver's specimens with his own, for the purpose of ascertaining synonyms. These authors were always at variance; for though they now and then speak of each other with civility, they much more frequently lay aside all decorum in their criticisms. Plukenet in his *Mantissa* (see PLUKENET) handles Petiver very roughly; nor was the latter at all behind-hand in abuse. This does not indeed appear by the generality of his publications; but we have seen in the collections of Tournefort and Vaillant at Paris, various tickets, whether manuscript or printed we cannot positively say, attached to a number of dried specimens, in which the subject of our present article displays a malignity and coarseness of criticism, directly calculated to defeat its own design, and of which we have scarcely ever met with another instance.

Petiver published, in 1702, the 1st and 2d Decades of his *Gazophylacium Naturæ et Artis*, the plates of which are in folio, the letter-press 32 pages in 8vo. These were followed by three more Decades in 1704, with 48 pages of letter-press; and "A Classical and Topical Catalogue" of the whole work was subjoined, in 14 pages more. The 50 plates, which compose these five Decades, contain a great number of objects of natural history, dispersed without any order, many of them very imperfect, especially the specimens of plants. In turning over these engravings, it is impossible not to recollect Shakspear's description of the Mantuan apothecary:

"— in his needy shop a tortoise hung,  
An alligator stuff'd, and other skins  
Of ill-shap'd fishes;" &c.

The insects are better than the rest, but of these the most famous is an imposture. The *Papilio*, figured in t. 10. f. 6, which Linnæus has named *Eclipsis*, and described from this figure alone, was found, on the inspection of the original specimen by Mr. Jones, to be no other than *P. Rhamani*, which, being artificially painted, imposed on our author. The late Dr. Grey indignantly stamped the specimen to pieces.

In 1709—1711 five more Decades of the same work came forth, with folio letter-press, and a folio edition of the "Catalogus Classicus et Topicus."

It would be impossible as well as useless to particularize the publication of every one of Petiver's lists and catalogues. They were all, as far as could be collected, republished in two vols. folio, under the title of *Jacobi Petiveri Opera*, by John Millan in 1767, price plain six guineas; or with the insects coloured, which is the best, seven guineas; and with the whole coloured, which must chiefly have been done from imagination, twenty guineas.

The first volume consists of the *Gazophylacium* extended to 156 plates, with explanations of all but the last, which contains 37 shells copied from Bonanni. A great part of the last fifty of these plates, at least, are compilations from printed works, such as those of Plumier, Pona, Merian, and others, whose figures certainly gain nothing in being copied and diminished by Petiver. Some of the plates, however, are taken from original drawings. The most extraordinary circumstance is his descending to copy his rival Plukenet, as in t. 106, f. 10 and 11, and elsewhere. The rest of this volume is made up of 22 plates of Amboyna shells and marine animals, copied from Rumphius; and two plates intended to teach the rudiments of Botany. The paper of our author on the virtues of plants, Phil. Trans. n. 255, is judiciously introduced into the letter-press of this volume; as well as an illustration of Ray's system, as far as regards English plants.

The second volume, designed to have commenced with the above-mentioned rudiments of Botany, is particularly estimable, as containing 72 plates of English Plants, with 12 plants in each plate, arranged and named according to the 1st and 2d editions of Ray's *Synopsis*. This performance, though incomplete, as it ends with the *Cuscuta*, R. Syn. ed. 2. 282, the last of the herbaceous plants, is of great importance in many cases. The figures shew, with tolerable accuracy, what was known of Ray's plants by his contemporaries, and have proved of use in some difficult questions, as appears by the *Flora Britannica*; though indeed few of them are done from original drawings, and some are copied from books erroneously cited by Ray himself, as the *Hieracium*, t. 13. f. 6, and the *Scilla*, t. 67. f. 5. Next follow four plates of useful Peruvian plants, not ill copied from Feuillée; and two of rare medicinal ones, chiefly from Pomet. Haller, who had no complete set of Petiver's works, says he remembers to have seen with disgust his very faulty representation of the plant yielding the Peruvian bark. Nothing certainly can be much worse than this figure, which occurs twice; yet we can perceive that it was taken from one of the large downy-leaved species of *Cinchona*, and not from what Haller had elsewhere seen represented; so that it throws some light on the obscure history of the valuable drug in question. It must also be recollected, that Petiver published these plates solely for the purpose of obtaining better information. They were intended to be sent abroad, to assist travellers in their enquiries, nor had he any thing better within his reach. Next to these plates follow five of marine plants or animals, and Italian grasses, copied from Boeone, Barrelier, &c.; and two of Egyptian plants from Prosper Alpinus. Copies of Plumier's *Filices*, with some *Fungi*, occupy 17 plates more, which are what Linnæus cites in his *Species Plantarum*, along with the original work. Three plates more of marine productions are subjoined. Six very useful ones of English *Papiliones* conclude the engravings of this volume. They are accompanied by printed catalogues of explanations, and various other papers, all, for the most part, the original impressions, which appear to have lain dormant on the bookfeller's hands, till this republication of the whole was contrived. The purchaser should, by collating his copy with some authentic one, take care that it is complete. The *Concordia Graminum, Muscorum*, &c., a work often cited by English writers, is one of the most valuable things in this collection. Our copy has but 12 pages, and ends with n. 375, being evidently imperfect; yet we have never seen more. The *Botanicum Anglicum; Hortus Siccus Chirurgicus* and *Pharmaceuticus*, consist of tickets, intended to be separately applied to dried specimens, for sale, like some publications of Ehrhart and Dickson. To them

are annexed labels for six different nostrums, sold, as we presume, by our author; these are the Indian Purge, Ambretta, Purging Marmalade, Golden Aqua Mirabilis, Purl Royal or Elixir Regale, and Syrup of Mamma, or the Cordial Purge. These favour of quackery, and account for the flourishing state of Petiver's finances; while they perhaps may partly explain the cause of Plukenet's disdainful enmity, as the latter was a learned and regular, but un successful, physician.

It does not appear that Petiver had any family, or that he was ever married. He died at his house in Alderigate street, on the 20th of April 1718, but of his age we find no mention. His body lay in state at Cooke Hall, and was probably interred at his parish church, to the charity-school attached to which he left 50 pounds, and five guineas to Dr. Brady for preaching his funeral sermon. His pall was supported by sir Hans Sloane, Dr. Levit, physician to the Charter-house, and four other physicians. We know not that any portrait of him is extant.

The collections of dried plants, and other natural productions, which belonged to Petiver, and, after his death, were bought by sir Hans Sloane, now make a part of the British Museum. They are frequently resorted to for the sake of ascertaining obscure synonyms, his plates being so generally cited by Linnæus, and in many instances so insufficient to express the precise object intended. Pulteney's Sketches of Botany. Haller Bibl. Bot. and Petiver's Works. S.

PETIVERIA, in *Botany*, a genus dedicated, with many compliments, by Plumier, to James Petiver, the English naturalist; see the last article. Plum. Gen. 50. t. 39. Swartz. Obs. 137. t. 10. f. 3. Linn. Gen. 181. Schreb. 241. Willd. Sp. Pl. v. 2. 284. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 2. 334. Juss. 84. Lamarek Illustr. t. 272. Gært. t. 75. Class and order, *Heptandria Monogynia*. Nat. Ord. *Holeracea*, Linn. *Atriplices*, Juss.

Gen. Ch. Cal. Perianth inferior, of four linear, obtuse, equal, erect, permanent leaves. Cor. none, "except the calyx, being coloured, should be so denominated." Linn. Stam. Filaments six to eight, awl-shaped, erect, unequal, mostly shorter than the calyx; anthers linear, cloven. Pist. Germen oblong, compressed, emarginate; style very short, lateral, received into a longitudinal furrow of the germen; stigma pencil-shaped. Peric. none. Seed oblong, compressed, dilated upwards, emarginate, furnished at each side with two rigid, acute, reflexed bristles.

Ess. Ch. Calyx of four leaves, inferior. Corolla none. Style lateral. Stigma pencil-shaped. Seed one, with four reflexed bristles.

Obs. Dr. Swartz has materially corrected the Linnæan character, in which the bristles of the seed were taken for styles; and finding the number of stamens, though variable from six to eight, very commonly seven, he has transferred this genus from *Hexandria Tetragynia* to *Heptandria Monogynia*.

1. *P. alliacea*. Guinea-hen Weed. Linn. Sp. Pl. 486. Stockh. Trans. for 1744. 287. t. 7. Trew Ehret. 33. t. 67. (*P. folani foliis, loculis spinosis*; Plum. Ic. 213. t. 219.)—Common about hedges and dry bushy places in the West Indies. Swartz. The root is perennial. Stem somewhat shrubby, erect, alternately branched, about two feet high, roundish, striated, downy, leafy. Leaves alternate, on short stalks, elliptic-oblong, three inches in length, generally smooth, with one rib and several transverse veins; their margin either quite entire, or with a few shallow blunt serratures. *Stipulas* a pair of obtuse, sometimes stalked, glands, at the base of the footstalks. *Spikes* terminal, very long

long and slender, of numerous, alternate, rather distant, erect, small, whitish or reddish *flowers*, of no beauty. We readily concur with Swartz, in uniting the *P. octandra* of Linnæus with his *alliacea*, nor do we find grounds to distinguish it, even as a variety; the stamens being in some flowers six, in others seven or eight, on one and the same plant.

The whole herb is said to have a very strong and volatile scent of garlick, so that some persons in Hispaniola use it as a remedy for the headache. When cattle, in distress for more grateful food, in the dry season, feed upon the *Petiveria*, it is said to give, not only their milk, but their flesh, and especially the kidneys, a powerful and disagreeable flavour of garlick. Sloane says that this inconvenience is cured, by removing the cattle to fresh pastures, where this plant does not grow, for about a week before they are killed. Guinea-hens are reported to be very fond of it.

PETIVERIA, in *Gardening*, contains plants of the woody, exotic, perennial, evergreen kind, for the stove, of which the species cultivated are, the common guinea-hen weed (*P. alliacea*); and the dwarf guinea-hen weed (*P. octandra*). See the preceding article.

*Method of Culture.*—These plants may be increased by slips or cuttings planted out in the summer, as well as by seeds; which must be sown on a hot-bed early in the spring. When the plants are come up, they should be removed into separate pots, and plunged into a moderate hot-bed. When the plants have obtained a good share of strength, they should be inured by degrees to the open air, into which they may be removed towards the end of June, placing them in a warm situation, where they may remain till autumn, when they must be placed in the stove, and during winter have a moderate degree of warmth.

They afford variety, and produce a good effect among other potted plants.

PETKAM, in *Geography*, a town of East Friesland; three miles S.E. of Emden.

PETNBOFEN, a town of Bavaria, in the municipality of Aichstatt; seven miles S.S.E. of Aichstatt.

PETOLA, in *Botany*, &c. See MOMORDICA.

PETOLA, in *Zoology*, a species of coluber, the scuta of whose abdomen are two hundred and nine; and the squame of the tail ninety. See COLUBER.

PETOLIN, in *Natural History*, the French name for a shrub of the pistachia kind, famous for affording bladders or tubercles on its leaves and tender branches, in the manner of the common turpentine tree; which are found full of insects. These insects are always found to be of the puceron kind, and some of them are winged, others not, as is known to be the case in that genus of animals. These bladders, and those of the turpentine tree, called its *horns*, have been by some supposed to be the natural production of the trees, but they are, in reality, only a peculiar species of bladder-galls, formed by these animals, one female of which making her way into the leaf, while the young raises its covering membrane into a bladder, in which it produces her young ones; which by sucking its sides, derive the juices to it, and occasion its increase. See PUCERON.

PETOUNE' HOTUN, in *Geography*, a town of Chinese Tartary, in the government of Kerim-Oube; 485 miles N.E. of Pekin. N. lat. 45 15'. E. long. 124 34'.

PETOUNE' KIANEN, a port of Chinese Tartary; nine miles N.W. of Petouné Hotun.

PETRA, a river of Naples, which runs into the sea, 13 miles N.E. of Bova.—Also, a town of Sicily, in the valley of Mazara; two miles N.N.W. of Girgenti.—Also, a seaport town, in the island of Metelin, situated on a rock almost inaccessible. N. lat. 39 27'. E. long. 26° 14'.

PETRAHAR, a town of Hindoostan, in Bahar; 20 miles E. of Ramgur.

PETRALIA, a town of Sicily, in the valley of Demona; 17 miles S. of Mistrella.

PETRALTA, a town of Naples, in Calabria Citra; five miles E.S.E. of Cosenza.

PETRANTA, a town of Etruria, near the sea-coast; 15 miles N.W. of Lucca. N. lat. 43 58'. E. long. 10 21'.

PETRARCHA, FRANCESCO, in *Biography*, one of the most celebrated names in the literature of the middle ages, was born at Arezzo, in Tuscany. His father was a notary in Florence, who, with his wife, was exiled in 1302, and took up his residence at Arezzo. After some changes in their abode, his parents, having lost all hope of being restored, carried him to Avignon, being then only eight years old. In that city, and in Carpentras, he passed his youth, receiving instructions, according to the mode of the age, in grammar, dialectics, and rhetoric. He then studied the civil law at Montpellier and Bologna, spending four years in the former city, and two in the latter. He however deserted the legal profession, though his father had set his heart upon seeing him in the doctoral robes. In his own justification he says, that he found it impossible, at that period, to practise the law in an honourable manner, and consistently with a just sense of integrity. At the age of 22 he returned to Avignon, and about that time he lost both his parents. Finding himself left in indifferent circumstances, he, together with a younger brother, enrolled himself in the clerical order, but only received the tonsure. At Avignon he contracted an intimacy with Jacopo Colonna, afterwards bishop of Lombes, which was the foundation of the attachment that he preserved during his whole life to the house of Colonna. With such a patron he might unquestionably have obtained high ecclesiastical preferment, but his habits of life were little conformable to the clerical character. He was particularly unfitted for this profession by that amorous passion which is so conspicuous a circumstance in his life and writings, and which commenced when he was about 23 years of age. Who was that Laura whom he has rendered so celebrated by his poems, became a subject of controversy even in his lifetime, and has ever since exercised the inquisitive talents of critics and biographers. The Italians acquiesce in the proofs adduced by the Abbé de Sade, that she was the daughter of Audebert de Noves, syndic of Avignon, and the wife of Hugh, son of Paul de Sade. The nature of his love has also been a matter of dispute; some have regarded it as a mere Platonic attachment, others have considered it as an ordinary sensual affection. If Petrarch is himself to be trusted, it was a real and a violent passion, which, for a long course of years, kept his mind in agitation, and influenced the whole tenor of his life. It appears to have been void of criminality, and no suspicion rests upon the virtue of Laura. It may not be amiss in this place to take notice of the theory of De Sade, and of its examination by Alexander Fraser Tytler, esq. This gentleman has written a very elaborate paper in the fifth volume of the Transactions of the Edinburgh Royal Society on the subject, and in defence of the purity of Petrarch's love, in opposition to the hypothesis of De Sade.

"The works of Petrarch," says Mr. Tytler, "bear evidence of his abilities as a politician, theologian, and philosopher, and it is in these characters that he appears to have been chiefly distinguished by his contemporaries, but it is not on these foundations that the lasting structure of his fame has been reared. It is to those incomparable verses,

in which he has celebrated the accomplishments and bewailed the fate of the beautiful Laura, that Petrarch has been indebted for his permanent reputation. The history of the poet's passion for his lovely mistress, must ever be regarded as forming the most interesting portion of his annals. His character, in fact, took its tone from that predominant affection, which influenced his studies, his habits of life, and all his pursuits and occupations. A love so pure, so ardent, and so lasting, is difficult to be paralleled in the history of human nature. Petrarch was the passionate admirer of Laura for 21 years, while she was in life, and with unabated ardour of affection, he is said to have bewailed her loss for 26 years after her death." The works of the poet bear the strongest testimony that this passion was an honourable and virtuous flame. Petrarch aspired to the happiness of being united to Laura in marriage, and from the same kind of evidence it is clear that Laura was not insensible to his passion. At length De Sade attempts, in his ponderous work, to blast the fair fame of the lady; maintaining, as we have seen, "that Laura was a married woman, the mother of a numerous family; that Petrarch had no other end in his pursuit, than what every libertine proposes to himself in the possession of a mistress; and that the lovely Laura, though never unfaithful to her husband's bed, was sensible to Petrarch's passion, gratified by his attentions, and continued to give him every mark of regard which, without a direct breach of her matrimonial vow, she could bestow upon him." Such is the hypothesis of De Sade, which has been fully examined by Mr. Tytler; into his reasoning we cannot enter, without transgressing the limits allotted to a biographical article in this work. He carries with him all the best feelings of the reader, and if his arguments do not amount to what may be denominated historic demonstration, yet they are strong, and deserving the regard of those who would be satisfied on the point under discussion. In the conclusion he says, "I have now, as I trust, impartially canvassed the whole of these arguments drawn by the author of the *Mémoires* from the works of Petrarch himself, or what may be termed the intrinsic evidence in support of the material part of his hypothesis, namely, that Laura was a married woman; nor do I think I presume too much when I say, that I have shewn their absolute insufficiency to prove that proposition." He then proceeds farther, and asserts, that in the whole of Petrarch's works, consisting of more than 300 sonnets and other poetical pieces, there is not to be found a single passage which intimates that Laura was a married woman. He then produces a variety of direct arguments on the subject, and he concludes; "if, while on the one hand we have shewn that there is not the smallest solidity in all that elaborate argument, which has been brought to prove that Laura was a married woman, we have proved on the other, from the whole tenour of the writings of Petrarch, the only evidence that applies to the matter, that his affection for Laura was an honourable and virtuous flame."

One of the methods taken by Petrarch to combat his unfortunate passion was frequent travelling, and in 1330 he accompanied Jacopo Colonna to his new bishopric of Lombes, where he passed the summer, and then returned with him to Avignon. That prelate introduced him to his brother, cardinal Giovanni Colonna, who was thenceforth one of his principal patrons, and in whose palace he became acquainted with the most learned men of the age. He made a more extensive tour in 1333, taking his course through Paris into Flanders, and thence to Aix-la-Chapelle and Cologne, and returning by Lyons to Avignon. By these and his other journies he increased his acquaintance

with men, and his knowledge of the manners and customs of the world. In 1334, a new pope having succeeded to the pontifical chair, under the name of Benedict XII., Petrarch began that course of remonstrance on the desertion of Rome, and the removal of the holy see to Avignon, which was ever after one of the favourite topics of eloquence in prose and verse. In 1336 he visited, with filial and classical reverence, all the monuments of antiquity which render Rome so interesting. The love of Petrarch was not of a kind to exclude transitory amours, and the manners of the age were little restraint to such indulgence; and it appears that in the year 1337 he had a natural son, who died while he was a young man. For the education of this son he shewed an anxious solicitude. It was about this time that he resolved upon that retreat which has made the name of Vacluse so famous in the annals of love and poetry. This place, situated in the county of Provence, where the river Sorgue springs from a rocky cavern, is a romantic solitude, well suited both to the lover and the student, and Petrarch seems to have enjoyed it in both capacities. He purchased a small house and farm in this sequestered spot, which was his favourite residence for many years. Here he composed not only the greatest part of his vernacular poetry, but many of his epistles in Latin prose and verse, and of his eclogues. Here likewise he wrote his books on a "Solitary Life," and on "Religious Tranquillity," and made a commencement, in 1339, of the poem on which he most valued himself, his "Africa." He did not entirely bury himself here, but made occasional visits to Avignon, and other places. The literary reputation consequent upon his writings, now began to make him extensively known. One of its most flattering effects was a letter addressed to him by Robert, king of Naples, the greatest protector of letters and learned men of the age. This connection was a prelude to the highest honour which could be conferred upon him as a poet, and which makes an era in his life. The ancient custom of solemnly crowning eminent poets in the capital of Rome had for some ages fallen into disuse. From the revival of letters in the 13th century, the honour of the laurel had indeed occasionally been conferred upon poets, but not in that place, nor with the former ceremonies. Petrarch had for some time indulged the hope of attaining this distinction, when in the month of August, 1340, he unexpectedly received a letter from the Roman senate, urging him to come and take the laurel in that city; and a few hours after, he was greeted with a letter from the chancellor of the university of Paris, containing a similar application in favour of that capital. He wavered for some time in his choice, but at length his own inclination, and the advice of cardinal Colonna, determined him for Rome. As he thought it a necessary form previously to submit to an examination of his learning and talents, he gave king Robert the honour of being his examinant, and accordingly repaired to Naples in March 1341. His reception from that monarch was of the most flattering kind, and they conversed together on equal terms of literary equality. During three days, Petrarch, in presence of the king and his whole court, sustained his trials, which related not only to poetry, but to all the sciences then cultivated; and, in short, he was declared worthy of the crown. Robert likewise decorated him with the honorary title of his chaplain, and appointed one of his courtiers to assist in his name at the ceremony in the Capitol. At Rome he was received by his friend count d'Anguillara, who fixed upon Easter-day for the time of conferring the destined honour. On that day, in the midst of the applause of the whole Roman people,

## PETRARCHA.

ple, and with a numerous attendance of persons of rank and distinction, the laurel was placed upon Petrarch's head by the count.

From Rome the poet went to Parma, where he passed some time with his protectors the lords of Corregio, and employed himself in finishing his "Africa," and it was probably from that family that he obtained the dignity of archdeacon in the church of Parma. At the accession of pope Clement VI., in 1342, Petrarch was one of the ambassadors sent to compliment him in the name of the senate and people of Rome, soon after which a priory in the diocese of Pifa was conferred upon him through the favour of the same pope. In the following year he composed his curious "Dialogue with St. Augustine," in which he confesses the passion for Laura, which still held dominion over his soul. That this confession was rather sentimental and rhetorical than penitentiary, is evident, as he makes no mention in it of a connection which about this time made him the father of a second natural child.

In the year 1348 Petrarch visited Padua for the first time, where he became acquainted with Jacopo da Carrara, who was one of his great friends and admirers, and it was this year that was remarkable for the universal pestilence which ravaged all Europe, and one of the victims to it was the celebrated Laura. The same pestilence deprived him of his great friend and patron cardinal Colonna, but he was now in such general esteem, that he was sure of an honourable reception from persons of the first rank wherever he went. He passed a year or two at Parma, Carpi, and Mantua, and in 1350 he again visited Padua, where Jacopo da Carrara, in order to detain him, procured him a canonry. From that city he wrote a very eloquent letter to the emperor Charles IV., exhorting him to come into Italy for the purpose of remedying the many evils with which that country was oppressed. Sentiments of piety induced him to take a journey to Rome, in this jubilee year, and in the way he saw Florence, for the first time, the place whence he derived his origin, and where he had several personal friends. Returning, he went to Padua and Venice; at the latter place he contracted a friendship with the celebrated doge Andrew Dandolo, and employed himself, though unsuccessfully, in mediating a peace between that republic and Genoa. After this he was invited to return to Florence, and take a part in their newly founded university, which he declined. He next went to Milan, with an intention of proceeding further, but he was received with so much kindness, and with such pressing solicitation to stay by Giovanni Visconti, its archbishop and sovereign, that he was constrained to take up his abode there. He was admitted into the council of state, and in 1354 was sent to Venice to make another effort for pacifying the two hostile republics, but his eloquence again proved fruitless. Upon the death of Giovanni, Petrarch attached himself to his nephew Galeazzo, by whom he was always highly honoured. In the same year he went to Mantua to meet the emperor, who having at length come to Italy, sent an equerry to Milan, to conduct into his presence the person of whose fame he had heard so much. Petrarch met with a most gracious reception; but the hopes he had conceived of great advantages to his dear country, from the visit of this monarch, all vanished upon his dishonourable retreat a few months afterwards. Petrarch, on this occasion, wrote a letter of censure to the emperor, but it is probable it never got into his hands, as he not only never lost the imperial friendship, but afterwards received a diploma conferring the title of count palatine. His fondness for solitude induced him to take a villa

three miles off Milan, where he passed his summers, but he says in a letter descriptive of his manner of life, that even here he found the greatest difficulty in subduing certain inclinations which appear always to have put his virtue to the greatest trial. Devotional practices were his chief resources against temptation, to which he joined very assiduous occupation by reading and writing by night and by day. In 1360 Petrarch was sent by Galeazzo to Paris, to congratulate king John on his liberation from English captivity, and his reception in that capital was answerable to the celebrity of his name.

By pope Innocent VI. Petrarch was treated at first with much neglect or even contempt, but in the year 1361 he had so far overcome his prejudices, as to offer the poet the place of apostolical secretary, which he declined, as he did also a very pressing invitation from John, king of France, to reside at his court. When pope Urban V. had succeeded to the pontifical chair, he presented Petrarch with a canonry of Carpentras, for the purpose of attracting him to his court, but it did not answer the purpose. The pope condescended to send him several invitations to visit him, but advanced years, and infirmities to which he was subject, retarded Petrarch's resolution to pay his homage to the father of Christendom in his proper residence; nevertheless, in 1370, he undertook the journey, but owing to ill health he was unable to accomplish it. He returned to his villa, where, in a very short time, he had the mortification to hear of Urban's death. His successor, Gregory XI., was very desirous of serving the poet, but he had reached that period of life when a quiet retreat was the most desirable. He was, however, constrained, in 1373, to undertake a journey to Venice, on account of his patron Francesco da Carrara, who, having had a difference with the republic, was obliged to submit to the condition of sending his son to ask pardon and swear fidelity, and was very desirous that Petrarch should accompany him. It was also to be his office to harangue the Venetian senate; but on making the attempt he was so overcome by the dignity of the assembly, and his own fatigue, that he stood silent. The discourse was accordingly deferred till the next day, on which he happily succeeded. On his return to his villa near Padua he fell into a state of languor, in which he passed the concluding months of his life. At length, in the night of July 18th, 1374, he was attacked with an apoplectic fit, and was found dead the next morning in his library, with his head resting on a book. His remains, attended by the prince of Padua, Francesco da Carrara, the bishop, all the clergy, and the principal persons of the city, were deposited in the church of Arqua.

Petrarch was unquestionably one of the most memorable characters of his age and nation: his fame is, however, founded chiefly on his Italian poetry. He had paid great attention to moral philosophy, and published several works upon it. His treatises "De Republica optime administranda," and "De officio et Virtutibus Imperatoris," prove that he had paid attention to political and military subjects. He left works also on theology, which shew that he was perfectly orthodox: on history and geography. But it is not only as an author that literature is indebted to Petrarch; no one had a greater share in bringing to light those writers of antiquity, the revived study of whose works was the great instrument of dispelling the barbarism of the dark ages. He was actuated by an enthusiasm in this matter, and was indefatigable, both in his own researches, and in solicitations to his friends in different parts, for the same purpose. The works of Cicero were especially the object of his assiduous enquiry,

enquiry, and to him is owing the discovery of the valuable Familiar Epistles of that great man. Although his reading was chiefly confined to Latin authors, yet he extended his search to the Greek, and his literary reputation procured him from Constantinople the present of a copy of Homer's poems. He had collected, with great care and expence, a large library, which in 1362 he presented to the republic of Venice. After this he probably collected another; and Petrarch himself alludes to a collection which he had made of imperial medals in gold and silver, and which he offered to the emperor Charles IV. This is the earliest mention of a treasure of that kind. The esteem in which this great man was held by his countrymen, was shewn by the vast number of commentators on his works, especially his Italian poems, which appeared from his death to modern times. The editions of his poems have been almost innumerable. The earliest was that of Venice in 1470, and the best is said to be that also of Venice, in two volumes 4to. 1756.

PETRARIA, in *Ancient Writers*, is sometimes taken for a quarry of stone.

In other places petraria is used for a fort of engine of war, with which stones were cast on the enemy; chiefly used in sieges, &c.

PETRASTRUMIA, in *Geography*, a town of Naples, in Principato Ultra; 9 miles S. of Benevento.

PETRATSCHAN, a town of Prussian Lithuania; 4 miles W.S.W. of Regnitz.

PETRE OIL, Πετρελαιον, the same as petroleum. See PETROL.

PETRE, Sir WILLIAM, in *Biography*, an eminent statesman, was born at Exeter, and educated at the college of that name, at Oxford; but in 1523 he was elected fellow of All-Souls. He took his doctor's degree in civil law. His talents recommended him to Thomas Cromwell, by whose means he was employed in state affairs, and was in the commission for visiting the monasteries. He obtained a large share of the church lands in the reign of Mary, to whom he had been counsellor, as he had been to her father and brother. He found means to ingratiate himself with queen Elizabeth, who appointed him one of her secretaries of state, and member of the privy council. He was a great benefactor to Exeter and All-Souls' colleges, and founded several charitable institutions. He died in 1571; leaving very large estates in Essex, which are now in the possession of his descendant, the present lord Petre.

PETREA, in *Botany*, was so called by Houftoun, in honour of Robert James, lord Petre, who was born in 1710, and died of the small-pox in 1742. Peter Collinson, in a letter to Linnæus, speaks of this nobleman as "the worthiest of men, whose death was the greatest loss that botany or gardening ever felt in this island." After describing his lordship's spacious stoves, and many of their valuable contents, amongst which numerous tropical trees had attained a degree of growth not to be seen in any other garden; as well as the nurseries for more hardy kinds, in which, at the time of lord Petre's death, were 219,925 individuals, mostly exotic; the writer concludes thus. "As this young nobleman was the greatest man in our taste that this age produced, I thought it might not be unacceptable to give you some account of the greatness of his genius. But his skill in all liberal arts, particularly architecture, statuary, planning and designing, planting and embellishing his large park and garden, exceeds my talent to set forth." Mr. Collinson was seized with his last illness when on a visit to the son and worthy successor of this nobleman in 1768. (See COLLINSON.)—Reliq. Hoult. 5. t. 11. Linn. Gen. 315. Schreb. 413. Willd. Sp. Pl. v. 3. 313. Mart. Mill.

Dict. v. 3. Ait. Hort. Kew. v. 4. 38. Juff. 108. Lamarck Illustr. t. 539. Gærtn. t. 177.—Class and order, *Didymia Angiospermia*. Nat. Ord. *Personate*, Linn. *Vitices*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, bell-shaped; its limb very large, in five deep, spreading, oblong, obtuse, coloured, veiny, permanent segments; the mouth closed with five double abrupt scales. *Cor.* of one petal, wheel-shaped, unequal, smaller than the calyx; tube very short; limb flat, in five rounded, spreading segments, the middle one largest, and differently coloured. *Linn. MSS. Stam.* Filaments four, concealed within the tube, ascending, two of them shortest; anthers oval, erect. *Pist.* Germen obovate; style simple, the length of the stamens; stigma obtuse. *Peric.* Capsule obovate, flat at the top, concealed in the hollow of the calyx, of two cells. *Seeds* solitary, obovate, convex at the outside, flat at the inner, attached to the base of each cell.

Eff. Ch. Calyx five-cleft, very large, coloured. Corolla wheel-shaped, much smaller. Capsule of two cells, in the bottom of the calyx. Seeds solitary.

1. *P. volubilis*. Climbing Blue Petrea. Linn. Sp. Pl. 873. Jacq. Amer. 180. t. 114. Curt. Mag. t. 628.—Leaves and clusters simple.—Native of Vera Cruz, the Caracaos, and Martinique, where it blooms in November. Houftoun is said to have sent it to Chelsea garden before the year 1733; but we agree with Dr. Sims, that the flowers were probably never seen in England, till they appeared in Mr. Woodford's late collection at Vauxhall, in August 1802. It is observed to thrive best in rich loam, and a warm moist air, being advantageously trained over a trellis, where, if luxuriant, it must make a beautiful appearance, being one of the most elegant plants that can be imagined. The stem is shrubby, twining round every thing in its way, and ascending, without tendrils, to the tops of trees twenty feet high; its branches round, roughish, slender, and leafy. Leaves opposite, on short, thick, rather silky stalks, elliptic-oblong, entire, varying in length from two to five inches, and in breadth from an inch to an inch and a half, furnished with one rib and many transverse veins producing innumerable reticulations; rough on both sides to the touch, but not to the sight; shining above; opaque and paler beneath. Clusters about the ends of the branches, a foot or more in length, elegantly pendulous, simple, of many flowers turned one way. The stalks, minute bractæas, and tube of the calyx, are rough with silky brown hairs. Limb of the calyx smooth, light violet; its segments an inch long when fully grown. Corolla of the same colour, variegated with dark violet and white; sometimes it is said to be wholly white, the calyx remaining of its proper hue. The pistil is thought to be occasionally imperfect.—A specimen with lanceolate leaves, five or six inches long, gathered at the Caracaos along with the common kind, by Dr. Marter, seems to us a mere variety, but the following is certainly a new and very distinct species.

2. *P. multiflora*. Panicled Petrea. (Funis quadrifidus; Rumph. Amboin. v. 5. 4. t. 3.)—Leaves and clusters twice compound.—Gathered in the island of Honimao, or Honimao, by the late Mr. Christopher Smith, from whom we have an unnamed specimen. The stem is woody, climbing, branched, quadrangular, with four furrows; downy when young. Leaves opposite, on longish smooth stalks, twice ternate; leaflets on shortish stalks, ovate, undulated, entire, smooth on both sides; shining above; rather opaque and somewhat paler beneath, with a rib and veins like the former species; the terminal ones one and a half inch long; the rest much smaller. Clusters axillary, twelve or eighteen

inches long, twice compound, downy, composed of innumerable, somewhat whorled, *flowers*, of whose colour we can determine nothing from the dried specimen, but they appear to agree in that respect with the foregoing. Their size is rather smaller. The segments of the *calyx* are more contracted at the base, and its tube has ten strong ribs; whereas the other species has five principal ribs, far less conspicuous, and a number of minute crowded intermediate ones.

Such is our plant, which accords precisely with the figure of Rumphius; but his description is less applicable. What he asserts, of the main stems splitting into four parts, and discharging a bitter limpid water, we have no means of verifying. He says the *flowers* are yellow, or whitish, with six minute *petals* and as many *stamens*, having in the middle a cloven *pistil*, like a lizard's tongue. The *germen* is said to turn black as it ripens; but of the nature of the *fruit* he gives no account.—Notwithstanding this description, his plate exhibits the *calyx* in five deep segments, with others in an early state, exactly as in our specimen. There is no representation of the *stamens* or *pistil*. He describes the *leaflets* twice as large as we find them, and remarks that their stalks, when old, become *claspers*. The *stems* are very tough and pliant, serving for ropes. On the whole there seems little doubt of the plant of Rumphius being the same with our's, nor, though we have often had his plate and description in contemplation, do we find any thing so applicable to them as this *Petrea*.

PETREA, in *Gardening*, contains a plant of the climbing, exotic, shrubby kind for the stove, of which the species cultivated is, the twining *petrea* (*P. volubilis*).

It has a variety with bright blue petals.

*Method of Culture*.—This is increased by seeds, which must be obtained from the places where the trees grow naturally, and be sown in pots plunged into a good hot-bed; and when the plants come up, they should be each planted in a separate small pot filled with light loamy earth, and replunged into a hot-bed of tanners' bark, and be afterwards placed in the bark-bed in the stove, where they must constantly remain, and be treated like other plants of the same country.

They afford ornament in stove collections.

PETREL, in *Ornithology*, the name of a very remarkable bird, called *procellaria* by authors. See FULMER, and PROCELLARIA *glacialis*.

PETREL *Island*, in *Geography*, a small island in Dusky bay, near the coast of New Zealand, N. of the harbour in Anchor island.

PETRELLA, a town of Naples, in the county of Molise; 11 miles E. of Molise.—Also, a town of European Turkey, in Albania; 26 miles S.E. of Durazzo.—Also, a town of the duchy of Urbino; 20 miles N.W. of Urbino.

PETRI, CHRISTIERN, in *Biography*, was a learned Danish divine, who flourished in the 16th century. It is not certain when he was born; but it appears he pursued his studies during several years at Paris, where he was admitted to his degree of M.A. Upon his return to his native country, he was made canon of Lunden, and also chancellor of that see. After this he took a second journey to Paris, where he was entrusted with the care of editing "*Danica Historia*, lib. xvi. *Autore Saxone Grammatico*," which made its appearance in the year 1514. He was in Denmark at the time Christiern II. was compelled to fly from that country, and he followed him into exile. Soon after that event, and until the time when that prince was imprisoned, and his affairs became desperate,

Petri took up his residence in Flanders, where he renounced the communion of the church of Rome, and embraced the principles of the Reformation. He became now exceedingly zealous in propagating the doctrines which he had adopted; and with this view wrote and published various works at Antwerp, in the Danish language, from 1528 to 1531. Among others he published, in 1529, "*The New Testament translated into Danish*." Nor was he less zealous in making converts from Popery, after his return to his native country in 1532. Little more is known of him, but that he died at an advanced age, under the reign of Christiern III., who, notwithstanding the change in his religious faith, permitted him to enjoy to the last the emoluments of his canonry. He left behind him a number of works, chiefly on theological subjects, and on the education of youth. Moreri.

PETRI, or *Petieri*, in *Geography*, a town of Africa, on the Ivory coast.

PETRICOW, a town of Bohemia, in the circle of Chrudim; 9 miles S. of Chrudim.

PETRIDIA, in *Natural History*, the name of a genus of fossils of the scrupi kind, of a plain uniform structure, of no great variety of colours, and emulating the external form of pebbles.

Of this genus there are twelve known species. Hill.

PETRIFACTIONS, are animals and vegetables, or their parts, changed into a fossil substance. In the Linnæan system, by Gmelin, petrifications make the fifth class of minerals, which is divided into eight genera, *viz.*

Anthropolithus,	Man, or the parts of man.
Zoolithus,	Mammalia, or their parts.
Ornitholithus,	Birds, or their parts.
Amphibiolithus,	Amphibia, or their parts.
Ichthyolithus,	Fishes, or their parts.
Entomolithus,	Insects, or their parts.
Helmintholithus,	Worms, or their parts.
Phytolithus,	Vegetables, or their parts.

Before we treat of these genera, in the order in which they stand, we shall give a general outline of the subject, as it is described in Mr. William Martin's "*Attempt to establish a Knowledge of extraneous Fossils on scientific Principles*;" referring our readers to the work itself for the details, and also to his other work, entitled "*Figures and Descriptions of Petrifications collected in Derbyshire*," &c.

Mr. Martin says, that the natural bodies which constitute our globe are either organized or unorganized: the first includes animals and vegetables, the latter fossils.

Fossils are usually distinguished into *native* and *extraneous*. Native fossils, or minerals, are fossils destitute of an organic form, exhibiting such a structure only as arises from the apposition or continual addition of the particles of which they are composed. Extraneous fossils, or *relics*, are fossils that have the form or structure of animal or vegetable bodies. If it be objected, that these bodies possess an organic form; it may be replied, that they may nevertheless be regarded as unorganized, since that form is no longer instrumental to growth, motion, or the propagation of the species.

Extraneous fossils comprehend two sorts of animal and vegetable relics, *viz.* the *conservata* and *petrifacta*: the former are the remains of animals or vegetables, preserved by various operations of nature among minerals; the latter are mineral bodies, which have received their form from animals or vegetables.

The phenomena attendant on extraneous fossils are *general* or *peculiar*. The general phenomena are such as are common

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mon to both kinds of organic remains: these are the following.

Extraneous fossils have been found in every quarter of the known world: they are met with embodied in the hard rocks and stones; but they are not equally common to all rocks and mineral substances, inasmuch as granite, sienite, gneiss, micaceous schistus, and some species of limestone, never contain organic remains; and those rocks, in which extraneous fossils are never found, constitute the highest mountains. The parts of organized bodies most common in a fossil state, are those which are known longest to resist putrefaction and decay: these are wood, and the leaves and stems of certain plants; shells, bones, corals, and other hard parts of animals. Very tender and succulent bodies, whether animal or vegetable, are rarely found in a fossilized state. Shells, and various exuviae of the vermes class, are most commonly found in the strata immediately reposing on, or following tracts of granite, gneiss, and the other rocks, in which extraneous fossils are never imbedded. Strata containing the remains of fish and marine shells, &c. mixed sometimes with the parts of amphibious animals and plants; or those in which vegetables only occur, generally succeed, or rest on the tracts, in which the exuviae of vermes alone are found. The remains of land-animals, particularly of the class mammalia, rarely occur in regular strata. Animal reliquiae, particularly the marine, are most common in calcareous strata; whereas vegetable reliquiae frequently occupy argillaceous beds, especially those productive of coal.

The phenomena peculiar to petrifications are as follow: petrifications are generally confined to mountains, or other elevated situations, where the more ancient of the secondary strata are presented to our view; they are usually incorporated in the earths and stones, of which these strata consist, forming, as it were, a part in the original fabric of the globe; no particular petrification is confined wholly to one kind, or species of stones; the substance, which forms the petrification, is frequently of the same nature as the surrounding rock; when it differs, it is found to consist of mineral matter, with a finer texture or grain than that of the matrix. A petrification often consists of several distinct minerals: thus chalk and flint often form separate parts of an *echinite*; and in Derbyshire, chert, calcareous spar, bitumen, and quartz, are frequently incorporated together in the same shell.

The common constituent substances of petrifications are earths and stones of the calcareous, argillaceous, or siliceous class. Animal petrifications are less common, in proportion to the degree of locomotive power which the originals possessed.

Shells and zoophytes abound in petrifications: fish and insects without wings are more rare. The petrified remains of mammalia are still less frequent; and winged insects and birds have perhaps never been found in this state.

The vegetable petrifications most common are such as bear the form of plants, growing in moist and boggy grounds. The petrifications hitherto recognized, however, as bearing the forms of plants or animals, known to exist at present, are very few, compared with those, the living species of which have not been discovered.

A petrification seldom, if ever, exhibits a complete change, or substitution of mineral for organic matter; more or less of the original animal or vegetable substance being generally present, and discoverable either in the external or internal parts of the fossil. In petrified shells and corals, the original calcareous matter is frequently seen covering the

surface, or remaining in small portions in the internal parts, and is readily distinguished, although the substituted mineral, forming the principal portion of the fossil, be also calcareous.

The petrifying process is carried on, in some waters, at this day, of which we have a striking instance at Matlock; but it appears to be confined to the formation of petrified wood, or woodstone. Petrifications rarely exist in veins.

The phenomena peculiar to the Conservata are as follow: they are for the most part found in low or flat tracts, where the strata are evidently of modern formation. They are also found in the caves and fissures which pervade the more ancient mountain strata, but are rarely incorporated in the stone, or other substance of which such strata consist: they occur also in the beds of rivers, and in most situations where mineral or other matter is daily accumulating: they are found in all states, between that in which actual decay takes place, and that in which farther decay is prevented, either by a new combination in the remaining principles, by an impregnation with mineral particles, or by some other natural process incident to these bodies. The animal conservata most common are such remains as are most rare in the petrified state, such as the bones of mammalia and fish, and shells of the same genera as those found in the neighbouring seas. The most common vegetable conservata are wood, and other parts of trees: they are more frequently referrible to plants and animals now existing than the petrificata, and they are not uncommon in mineral veins.

The origin of extraneous fossils is shewn by the attendant phenomena. The conservata cannot be said to originate from, since they really are the remains of, plants and animals, introduced, by different processes of nature, into the mineral kingdom: but petrificata owe their form to organized bodies; they derive their substance generally from minerals.

It is inferred by Mr. Martin, that the introduction of extraneous bodies into the mineral kingdom has been effected in various modes, and at various periods, during a succession of ages; but with respect to those from which the petrificata derive their form, chiefly while the superficial parts of the globe were in their primeval liquid state, and the ocean far above its present level. He therefore considers the periods at which, and the agency by which, the deposition of organic bodies has been effected in the mineral regions.

The periods of introduction, he says, may be reduced to three: the first commencing with the existence of marine animals, and ending with the formation of plants. During this period, the most ancient of the secondary tracts were formed, and the remains of the zoophytes and shell-fish, the only animals apparently then existing, enveloped in the substance of the strata.

The second, commencing with the formation of plants, and an increase of those animals which are peculiar to the ocean; ending with the time at which the ocean, after a gradual subsidence through several ages, first attained its present level. During this period our author supposed the less ancient and some modern tracts were formed, and the remains of plants and fish, as well as shells, and other relics of the vermes, added to the fossil world; and he adds, "Towards the middle of this period, it is probable the mammalia and other land animals were either created, or considerably increased in number, as their remains are found, though very sparingly, in some modern strata, supposed to have been deposited just before the sea had finally retired to its present limits."

The third period commences with the reduction of the ocean

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ocean to its now actual level, and continues to the present time. Throughout this period, modern and very recent tracts of alluvial and other strata have been deposited, and various extraneous fossils, particularly the remains of mammalia, introduced into the mineral kingdom.

The *agent*, according to Mr. Martin, by which the introduction of extraneous fossils into mineral strata has been chiefly brought about, is water; that is, of the ocean, of ancient lakes and inland seas, of rivers, local inundations, and perhaps the general deluge.

To the agency of the ocean, in a primary state, is to be referred all deposits of sea-shells, and other marine bodies found in strata, which do not alternate with strata, holding the remains of fish or plants. To the same agent, during the second period, are to be ascribed all other accumulations of organic bodies, in which marine remains make a considerable part, and which are deposited in regular determinate beds of stone, &c. "Sea-shells and other marine bodies," says Mr. Martin, "possessing but a small degree of locomotive power, evidently have been generated, have lived and died, in the same accumulated heaps which their remains now exhibit. These, apparently, in some instances, have been gradually entombed in matter, precipitated from an immense body of water, slowly without alteration, through an unknown length of time, and hence forming strata of great thickness. In other tracts, marine bodies of the vermes class have been more quickly enveloped. The matter of the deposition, having been repeatedly changed, forms, in such cases, only thin, successive strata of various kinds of earths and stones, alternating with each other. Fish, &c. endued with a great degree of locomotive power, have probably been arrested in their course, and instantly killed, by some sudden diffusion of matter inimical to animal life." Some persons have thought this to have been effected by sub-marine volcanic eruptions.

"Where vegetable fossils, whose originals grew on dry land, are found mixed with marine shells, in deep and regularly disposed beds, it is obvious that a transportation of vegetable bodies from the land to the sea must have taken place. In such instances, it appears probable that plants and wood, specifically lighter than water, would remain floating for a certain length of time, before their deposition at the bottom of the sea could be accomplished; and that this, at last, must have been effected by a gradual attachment of mineral particles, such as the sea then abounded with, to the surface of these floating leaves, stems, &c.; thus inducing in each individual that degree of specific gravity necessary for its subsidence, and final deposition, in the depths of the ocean."

The deposition of vegetable matter, &c. in inland seas, would be carried on, for a certain length of time, under the same processes as those supposed to have taken place in the ocean. The influence of rivers, currents, &c. in the immediate deposition of organic remains among mineral matter, is only to be traced in those accumulations of sand, gravel, clay, &c. To local inundations are to be referred most superficial accumulations of organic fossils, not deposited in regular strata, and which are not immediately connected with the course of still existing rivers. Partial inundations of fresh waters appear, in many instances, to have occasioned the deposits of animal bones, so frequent in the loose earth or soil of those alluvial tracts, which have not originated from the deeper, but more contracted influence of rivers and currents. To sudden inundations may be perhaps ascribed the destruction, at least, of those animals, whose bones are found in clefts and chasms of ancient strata. To

the agency of the general deluge are to be referred the superficial depositions of marine and other remains mixed with each other, and lodged in cavities, &c. at heights to which no partial inundation of the sea could reach.

Mr. Martin, in a note, p. 36, says, "it perhaps may be doubted, if any deposition of organic bodies has ever yet occurred, unequivocally demonstrative of a general flood. The shells found in Peru, on a mountain considerably higher than any affording similar remains in Europe, appear to have been perfect petrifications, included in the substance of the stone of which the mountain consists: of course, they prove the submarine formation of the rock in question, but not that its contents have been elevated to their present situation by the deluge. Even loose or unconsolidated deposits of marine remains, sometimes found, according to Pallas, in the more external fissures and veins of lofty primary rocks, in which extraneous fossils do not occur as integrant parts, are no certain proof of this event. It is highly probable, that secondary strata have originally covered many elevated tracts, where there is at present no appearance of such formation: and that extraneous fossils, formerly imbedded in these secondary strata, will remain in a very complete state of preservation, long after their original matrix has been destroyed, is indeed a fact sufficiently illustrated by the loose reliquia so abundant in the common soil of some countries, and which have been liberated undoubtedly by the waste and decay of their native rock. When, however, the remains of marine and of land animals occur together, in superficial accumulations, they certainly exhibit a less ambiguous evidence of the deluge; yet not altogether a decisive one, except both kinds of reliquia are found in a similar state of preservation. If, on the contrary, the shells are petrified, and the bones are in nearly a recent or unmineralized condition, it is obvious that they were not originally introduced into the fossil kingdom at the same period; and hence the support which the presence of marine objects gives to the conclusion, that such deposits are truly diluvian, is done away with." Mr. Martin adds, "It must not be inferred, that we wish to establish a disbelief of the general deluge. The existence of that event is confirmed by authority far above the evidence of geological facts. But in the present study, it is necessary to guard against the too common error of ascribing effects to causes, inadequate to their production."

Before we come to treat of the genera included under this class of mineralogy, we may observe that Mr. Parkinson, and some other modern writers, have discussed the subject under the general term *oryctology*. We have, in the article *Fossils*, given our reasons for maintaining the older term; and we may add, that as the more modern one comes from the Greek *ορυσσω*, *to dig*, and *λογος*, *a discourse*, or *treatise*, it does not necessarily lead the reader to *petrifications*, but to any other substances dug out of the bowels of the earth. We, however, take pleasure in referring to Mr. Parkinson's work, entitled "*Organic Remains of a former World*," in which our readers will find abundance of important and interesting matter. His conclusions are, that it appears obvious, from what has actually been discovered, that a considerable number of species, kinds, and perhaps orders of animal, vegetable, and mineral materials, have been lost for ages, and consequently that the general state and inhabitants of the earth have undergone some very remote and very considerable change; and it must be equally obvious, that such change must have been produced by some such event as the deluge described in the Old Testament; the book of nature thus bearing ample evidence to the

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the truth of the book of revelation. Nothing, he adds, is clearer than judging from the general nature of the fossil materials of the antediluvian world which have reached us, or at least are known to have reached us, that the post-diluvian world has a very high comparative advantage, is actually richer, and to a considerable extent, in valuable productions, and is much more fitted for the necessaries, and even comforts and luxuries of civilized life. Hence, independently of the accomplishment of any other important purpose, by the revolution of a former world, one grand object appears to have been attained, *viz.* such an arrangement of the seeming ruin, as produced the regeneration of a world stored, in its deepest recesses, with substances calculated to promote the comfort of man; to tempt him to the exercise of his innate powers, to furnish him with the means of maintaining his dominion over the animals around him, and even to urge him to a change from the savage to the civilized state. Another world rises from the overwhelming flood, composed of the fragments of the former, which appear to be blended together in an apparently disordered and incongruous mass. But after the lapse of a small period of time, the constituent parts of the newly-formed world are discovered to be arranged according to those wise laws which the great Creator had decreed from the beginning. The surface again teems with animal and vegetable life; and the fresh creation, enriched by a melioration of its materials, obtains an increase both in its stock of utility and beauty.

### Genera.

**ANTHROPOLITHUS.** The human body, or some of its parts, changed into a fossil substance.

### Species.

**TOTALIS;** the whole human skeleton. This, according to Gmelin, was found, in 1785, at Fahlun, in Sweden, imbedded in a mass of sulphuret of iron or pyrites, and converted into a hard stone. Other specimens are said to have been found in some mineral waters in France, and near Freyburg and Saxony. Mr. Parkinson, however, maintains that no well-attested instance of the mineralized remains of man is known.

**PARTIALIS;** the cranium, or other bones. These are said to have been found in France, at no great distance from Rheims. In a cavern, in the Mendip-hills of our own country, some human bones have been found invested with stalactite; but they seem to be but of modern existence.

**ZOOLITHUS.** The body of some animal of the order mammalia, or its parts, changed into a fossil substance. Of this genera there are enumerated eight

### Species.

**TURCOSA;** the teeth; hardish, and of a blueish-green colour. These have been found in the copper mines of Cumberland, in Persia, Siberia, Bohemia, France, Germany, &c.; and are held in great estimation by the inhabitants of the East. Their colour is greenish, with a tinge of blue, which, after long exposure to the air, becomes a dirty yellow brown or blackish, opaque, hard, adhering a little to the tongue, and admitting some degree of polish and lustre; their colour seems to be acquired by the oxides of iron or copper.

**OSTEOLITHUS;** the bones becoming a calcareous substance. These have been found in Great Britain, and many parts of the continent, converted into limestone.

**SIMILE;** the entire skeleton of an ape, found in the

year 1733, at Henneburg, near Glucksbrun in Germany, imbedded in bituminous marle, impregnated with copper.

**ELEPHANTIS;** the tusks, grinders, and bones of the elephant, found in various bogs of England and Ireland. According to Mr. Parkinson, much remains to be ascertained with respect to the fossil bones of the elephant, of which considerable numbers have been found in various parts of France, Germany, and Italy, as well as in this country; but no where are they so abundant as in Siberia. In America the remains of an unknown species of this animal are also very abundant. For the existing species, see **ELEPHAS.** The elephantine remains which have been found in Siberia, have been supposed to belong to no species now known, for though the teeth are formed of plates disposed parallel to each other, as in the Asiatic elephant, these plates are said to be thinner, and consequently more numerous. The remains of elephants discovered in this country seem to be referrible, in most instances, to the Asiatic. With regard to the elephant, whose remains have been found in America, the tooth of which differs essentially from all known fossil or recent species, in having its crown cuspidated and covered with enamel, there exists at present every reason for supposing it to be a species now extinct. The general opinion was, that this animal was carnivorous, which is contradicted by the assertion, that the stomach of one of these animals has been found filled with vegetable matter. An animal of this kind, with its flesh, skin, and hair, has been lately found in Siberia.

**CERVI;** the skeleton, horns, or separate bones of the stag. These are found frequently buried in the ground in some mountains in England and Ireland, especially the horns of the moose deer; and also in the mountains near Baruth in Silesia, sometimes the whole skeleton, and sometimes parts only. In Ireland there have been found the remains of deer, of a size far exceeding any now known; and in Scotland the remains of an elk, as well as those of an enormous animal of the ox kind, but larger than even the urus.

**ROSMARI;** the head of the morse (see **TRICHECUS**); found in the neighbourhood of Bononia in Italy.

**BOVIS;** the skeleton of the ox, found about a century and a half ago between Querfurt and Gutterstadt in Saxony. See **CERVI**, above.

**SORICIS;** the skeleton of the shrew; found in Bohemia, buried in schistus. See **SOREX**.

Before we quit this genus, we may observe, that in most parts of Europe remains of large animals have been found; and in both North and South America, the reliquiae of enormous unknown animals have been discovered. According to Pallas, from the Tanais to the continental angle nearest to America, there is hardly a river in this immense space, especially in the plains, upon the shores, or in the bed of which, have not been found the bones of elephants, and of other animals not of that climate. From the mountains by which Asia is bounded, to the frozen shores of the ocean, all Siberia is filled with prodigious bones. The best fossil ivory is found in countries nearest to the arctic circle, as well as in the eastern countries, which are much colder than Europe, under the same latitude; countries in which only the surface of the ground becomes thawed during the summer.

The number of bones which have been discovered of the rhinoceros is very considerable, not only in Siberia, but in Germany, and other parts of Europe, and in the opinion of St. Fond and others, they are all of a double-horned species, similar to the rhinoceros of Africa. It is, however, supposed

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posed that the rhinoceros, which corresponded with all the fossil remains, was the rhinoceros of Sumatra.

**ORNITHOLITHUS.** The body, or parts of a bird changed into a fossil substance. Of this genus there are three

### Species.

**ROSTRI;** the beak; found in the neighbourhood of Jena, and in the mountains on the confines of Switzerland, sometimes perfect, sometimes only impressed on a schistose swinestone.

**OSSIUM;** the bones of birds found in Silesia.

**PLUMARUM;** the feathers of birds, which are found principally at Oeningen, on the confines of Switzerland, impressed on a schistose swinestone. Notwithstanding this enumeration, the fossil remains of birds are very rarely met with, although, as Mr. Parkinson says, they are frequently mentioned, and even described, by different authors. Fossils, much resembling the beaks of birds, are sometimes found, but these are supposed to be parts of fishes. Several of those specimens which have been spoken of, as petrifications of whole birds, and of their nests, have been merely calcareous incrustations of very modern formation. Bones very much resembling the bones of birds have been found in the calcareous stone of Oxfordshire, and in some parts of France and of Germany.

**AMPHIBIOLITHUS.** The body, or some part of an amphibious animal changed into a fossil substance. Of this three species are mentioned.

### Species.

**TESTUDINIS;** the Tortoise. This has been found entire, or in parts, sometimes in the stone quarries of Oxfordshire; in a bed of schist in Switzerland; on St. Peter's mountain near Maefricht in Brabant; in Malta; in Leipzig, and other parts of Saxony.

**RANÆ;** the toad or frog. The head of a frog found in a bed of schist in Switzerland, and an entire petrified toad in a slaty swinestone at Oeningen.

**CROCODILI;** the entire skeleton of a crocodile. A specimen of this was found near Ellon in Gloucestershire, in indurated clay; and others near Drax in Aquitain, at the depth of nearly fifty yards under the surface of the earth; near Suhl in Henneburg, and near Boll in Wirtemberg in a slaty stone.

The fossil remains of amphibia, says Mr. Parkinson, are very numerous, and supply us with ample exercise for enquiry and admiration. In different parts of England, particularly in Somersetshire and Devonshire, the remains of animals apparently of the *Lacerta* genus are frequently found; but are, as far as we are able to judge, really different from any animal which is known to us. A most beautiful specimen of part of the jaw of the fossil animal of St. Peter's mountain, already referred to, was presented to the Royal society by professor Camper, and is now deposited in the British museum. A specimen of the head of this animal has been also obtained from the same mountain by Faujas St. Fond, and is delineated in the work which he has given the world descriptive of the fossil riches of that mountain. The plates of St. Fond, as well as the specimen of professor Camper, shew that these are the remains of an enormous animal, different from any at present known. It must, however, be observed, that the remains of crocodiles, apparently of the same species which now exist, have also been discovered; part of the head of the Asiatic crocodile was found in very good preservation in the quarries of Altdorf.

**ICHTHYOLITHUS.** The body or parts of a fish changed into a fossil substance. Of this genus Gmelin has enumerated four species, besides varieties, but instead of particularizing them we refer the reader to our article **ICHTHYOLITE.**

**ENTOMOLITHUS.** The body, or some part of an insect, changed into a fossil substance. See **ENTOMOLITHUS.**

### Species.

**CANCRI;** the crab or some of its parts. Found in various parts of Great Britain, and in most parts of the globe, in slate or foliated limestone, either entire or in parts, as the shell, legs, claws, &c. of various species.

**MONOCULI.** The *Monoculus polyphemus*, found near Solenhofen, in foliated limestone.

**PARADOXUS.** The *Oniscus paradoxus*, found in various parts of Great Britain and the continent, in various kinds of limestone, and indurated clay or slate, loose or affixed, solitary or in numbers, entire or in parts, straight, incurved, expanded or contracted; the head covered with a very convex, roughish, often three-parted shell, semilunar on the fore part, grooved its whole length, with two hemispherical or cylindrical, three-lobed, covered with a laminar shell, consisting of versatile triarcuated rings; the tail is thin, three-parted by three tubercles.

Insects of the smaller kinds are seldom found in a fossil state, the smallness of their size, and the delicacy of their structure, preventing their preservation. The one which is generally found in the most perfect condition is that which is commonly denominated the Dudley fossil, from its being found in the neighbourhood of Dudley in Worcesterhire. Other species of this have been found in Wales and Germany. From the imperfect state in which these insects have been found, little more, perhaps, can be said of them, except that the remains which have been examined shew that the covering of the body was formed by three series of thick crustaceous shells, transversely disposed in rows, the length of the body, while one plate served to give a covering to the head of the animal. Other remains of the smaller insects have been mentioned by different authors, but few or none appear to have been described as agreeing with any insect now known in existence. The remains of lobsters and crabs are frequently found in the isles of Sheppey and Malta, and some very good and perfect specimens were discovered in digging the archway at Highgate in the years 1812 and 13, one of which is in the possession of the compiler of this article. The remains of different species of these animals are also found in a compressed state in the schistous masses of Pappenheim and Oppenheim.

**HELMINTHOLITHUS.** The body, or parts of a crustaceous worm, or shell-fish changed into a fossil substance.

### Species.

**ASTERIÆ;** the star-fish, or its parts. The varieties of this, found in a fossil state, are as follows.

1. *Asterias papposa*, found in slaty limestone at Pappenheim.
2. *A. rubens*, found in St. Peter's mountain near Maefricht.
3. *A. minuta*, found in chalk-pits in various parts of England; it is small, of a reddish-white colour; in form of a star, or wheel with four or five radii; it is somewhat convex at the centre.
4. *A. glacialis*, found in France.
5. *A. reticulata*, found in France near Chaffois.
6. *A. aurantiaca*.

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7. *A. equestris*, in the sandstones in Saxony.
8. *A. ophiara*, in Italy and Germany, in marble, and with solitary rays in a yellow staining sandstone.
9. *A. pectinata*, at Pappenheim, in slaty limestone.
10. *A. multiradiata*, near Stutgard, with the rays aggregate.
11. *A. Caput Medusæ*, found generally in mountains of chalk, limestone or sandstone, sometimes the mere impressions are what are left.

**ECHINI**; the Echinus or Sea Hedgehog. Divided into two sections, *viz.* A, including the entire animal; and B, its parts.

### Section A.

1. *Echinus esculentus*, found in England, Saxony, Germany, &c. in chalk, lime, marble, flint or agate.
2. *E. excavatus*, in marble at Verona, of a yellow-grey colour.
3. *E. globulus*, in England, and divers parts of Germany, generally calcareous, rarely in flint.
4. *E. faxatilis*, in limestone near the salt-pits in Upper Austria.
5. *E. ovariis*, in England, France, and Switzerland, in chalk and limestone hills.
6. *E. diadema*, in the mountain Raudberg in Switzerland, and at Rottenburg in Westphalia.
7. *E. circinatus*.
8. *E. cidaris*, found in England, Saxony, Franconia, and various parts of Europe, in flint, chalk, or marble.
9. *E. mamillatus*, in Malta, Switzerland, on the limestone mountain Legerburg, and near Basseville in iron ore.
10. *E. lucunter*, in the chalk-hills of England.
11. *E. coronalis*, in the flint and chalk-hills of England.
12. *E. asterizans*, found filled with cretaceous matter, the shell itself being converted into spar.
13. *E. tessellatus*, in the chalk-hills of Basil.
14. *E. botryoïdes*.
15. *E. sinuatus*, in the chalk and limestone hills of England.
16. *E. femiglobosus*, in the calcareous mountains of Silesia and Switzerland.
17. *E. quinquelabiatus*, in the calcareous mountains of Switzerland.
18. *E. conoïdeus*.
19. *E. albo-galerus*, and the next, are found in the chalk-hills of England, and in marble in Lower Saxony.
20. *E. depressus*.
21. *E. vulgaris*, found abundantly in calcareous hills, in England, Germany, and Silesia.
22. *E. quadrifasciatus*.
23. *E. sexfasciatus*.
24. *E. fubuculus*.
25. *E. scutatus*, in the chalk-hills of England and Denmark.
26. *E. ovatus*.
27. *E. pustulosus*, in the chalk-hills of England, and in the marble rocks of Germany.
28. *E. quadriradiatus*, in the coarse marble of Holstein.
29. *E. minor*.
30. *E. dubius*.
31. *E. rofæus*, found in the mountains of Languedoc.
32. *E. altus*.
33. *E. orbiculatus*, in the calcareous mountains of Switzerland.
34. *E. fubrotundus*.
35. *E. corollatus*.

36. *E. orbiculus*, in Venice; near Brandenburg in Westphalia, and in Languedoc.
37. *E. placentæ*, in Malta.
38. *E. cor-anguinum*, in the chalk-hills of England, and coarse marble rocks of Germany.
39. *E. lacunofus*.
40. *E. radiatus*.
41. *E. complanatus*, in the limestone mountains of Switzerland.
42. *E. fubglobulus*, in the chalk-hills of England, and the marble of Switzerland.
43. *E. oananchytis*.
44. *E. bicordatus*, in the mountains of Switzerland.
45. *E. carinatus*, found in Norway.
46. *E. spatagus*, found in great abundance in the chalk-hills of England, near Mæstricht, and in various parts of Germany and Switzerland.
47. *E. briffoides*.
48. *E. ovalis*, found in the mountains of Switzerland.
49. *E. pyriformis*.
50. *E. lapis cancri*.
51. *E. patellaris*.

### Section B. The Parts.

This section includes specimens, 1. Of the spines, denominated Jew's-stone, of which there are nine varieties that do not require particular notice; 2. Of the knobs; 3. Of the separate compartments of the shell; and 4. Of the teeth of the shell, which last are found abundantly in Great Britain, and various other parts of the globe; the spines are shorter or longer, smooth, striated or studded.

**CHITON**, found near Creazzo, in the Venetian territories.

**LEPADIS**, or Acorn-shell. 1. *L. balanus* is found in Piedmont, in sandstone; in Malta, Languedoc, and near Dresden in Saxony. 2. *L. balanoides*. 3. *L. tintinnabulum*. 4. *L. mitella*: these three last are all found in Piedmont, either in sandstone or marble. Mr. Parkinson says, although several species of the *Lepas* have been found in a mineralized state, they are by no means frequent fossils. The *L. anserifera* is said to have been found fossil, and so has the *L. diadema*; these must, however, be exceedingly rare fossils.

**PHOLADIS**. The *Pholas* in a fossil state is by no means common; but the *P. crispata* has been found among the Harwich fossils; others have been discovered in Piedmont, generally imbedded in silica or limestone.

**MYA**. This is found in a fossil state in England, Arabia, Belgium, Switzerland, Germany, France, and other parts of the continent. The *MYA pistorum* (which see) is described by Solander as existing among our Hampshire fossils; a fossil mya of three or four inches in length is found in the rocks near Bognor.

**SOLENITES**. The *Solen* in a fossil state is found in Arabia, Belgium, Switzerland, Germany, France, and other parts of the European continent. Remains of the *S. filiqua*, and of the *S. ensis*, have been found at Harwich; and a small fossil shell, named by Solander *S. ficus*, has been found between Lymington and Christchurch.

**TELLINITES**. The *Tellina* is found fossil in Gloucestershire, Italy, Switzerland, Bohemia, Austria, &c. in clay or limestone. The varieties are, 1. *T. lingua felis*, in the limestone mountains of Switzerland and Wirtemberg. 2. *T. rostrata*, at or near Ball in Wirtemberg, in calcareous earth. 3. *T. donacina*, near Herbiopolis, in limestone.

**BUCARDITES**. The *Cardium*, or cockle, found in a fossil state

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state in the clay-pits at Richmond in Surry; at Sherborne in Gloucestershire; in the cliffs at Harwich; on Shooter's Hill, and in vast masses of grey limestone in the county of Cork; in Germany, Italy, Bohemia, Austria, and other parts of the continent.

**MACTRÆ.** This is found in the fossil state in Piedmont, about Verona in Italy, in England and Germany, generally calcareous.

**DONACITES.** The *Donax scortum* and *D. irus* are found in Germany and Switzerland.

**VENERIS.** Different species of the Venus are found in this and other countries of Europe, and the *V. papia* is met with on the continent of America.

**SPONDYL.** The *Spondylus gædaropus* is found in America, Switzerland, and Germany, and the *S. regius* in marble, near the salt springs in Upper Austria.

**CHAMITES.** Of the *Chama* eight species are found in a fossil state in the southern parts of Europe.

**ARCÆ.** The *Arca* is found in the cliffs at Harwich, and various parts of Gloucestershire and Oxfordshire, and likewise in many parts of Germany and Switzerland.

**OSTRÆ.** The Oyster, or scallop-shell, is found fossil in different counties of England, as Gloucestershire, Berkshire, Oxfordshire; also in Italy, Germany, and most countries of Europe, in chalk, flint, marble, clay, sandstone, &c.

### Section A. Scallops.

1. *Ostrea radiata*, is found near Witney and Gravesend, and in Germany.
2. *O. maxima*, in the Venetian territories, Malta, Hungary, and divers parts of Germany.
3. *O. jacobæa*, in Piedmont and Germany.
4. *O. ziczac*, in the Netherlands and Germany.
5. *O. minuta*, in Austria, near Brunn, and near Libochowitz in Bohemia.
6. *O. striata*, near Querfurt in Saxony, and in Hungary.
7. *O. pleurocetes*, found in various parts of Germany.
8. *O. pallium*, in Bohemia, Saxony, Switzerland, and Germany.
9. *O. nodosa*, in Alsace.
10. *O. pufio*, in Belgium, Germany, and Bohemia.
11. *O. glabra*, in Germany and Bavaria.
12. *O. fasciata*, found near Odolca, in Bohemia.
13. *O. lima*, found near Aaristorf, in Switzerland.

### Section B. Oysters.

The *O. diluviana*, *O. folium*, and *O. edulis*, are found in most parts of the globe.

**ANOMITES.** No bivalve exists as a fossil in such prodigious number as the *Anomia*. These shells are characterised by the beak of the larger or under valve, which is perforated, being greatly produced, rising or curving over the beak of the smaller or upper valve. Twenty-one of these species of shells are mentioned by Gmelin, of which the following seem most worthy of notice.

1. *A. gryphus*, found in England, France, Germany, Switzerland, &c. in gravel or clay-pits, sometimes with both shells joined.
2. *A. lacunosa* is one of the most abundant of these species. They are found in considerable numbers in different parts of England, but particularly in Lincolnshire, Warwickshire, and Gloucestershire.
3. *A. verrebratula*, found fixed or detached, in lime or flint, and sometimes filled with spar, near Witney in Oxfordshire, and also at Gravesend; likewise in Germany,

Saxony, Bohemia, Austria, and most parts of the continent.

**MYTILITES;** the *Mytilus* or *Muscle*-shell. Several species of this are known fossils, some of which approach very nearly to those which are recent, and one in particular appears to differ very little from the *M. modiolus*, which is found in various parts of Germany, fixed and marmoreous. The other principal ones are;

1. *Mytilus criati-galli*, found in Malta, Normandy, Switzerland, Germany. It is sometimes very large, and generally marmoreous.
2. *M. frons*; found in Christiansstadt in Sweden, in Belgium, Normandy, and Malta, in marble, sand, or flint.
3. *M. margariferus*; this is found near Aaristorf, in Switzerland; admitting a beautiful polish, and exhibiting the most splendid iridescent colours, according to its position in the light.
4. *M. edulis*; found in Piedmont, and very many parts of Germany, generally fixed and calcareous, sometimes ferruginous, or in sand-stone.

**PINNITES;** the *Pinna*. This also is found in a fossil state in Piedmont, near Aaristorf in Switzerland, in Franconia, and near Dresden in Saxony.

**NAUTILITES;** the *Nautilus*. Specimens of this, in the fossil state, are very frequent. They have been found in several parts of our own island: some fine specimens have been met with at Lyme in Dorsetshire, in different parts of Wiltshire, and at Whitby in Yorkshire. The finest specimens are thought to be found in the neighbourhood of Bath, and in the isle of Sheppey in Kent. In digging for the Highgate archway, a number of very beautiful specimens were discovered, some exceedingly large, and still retaining a resplendent pearly shell, highly decorated with pyrites; of which one is in possession of the compiler of the present article.

The shell with the outer whorl much larger than the others is common in Northamptonshire, Kent, Sheppey, and other parts of England; also in many countries on the continent. It is generally marmoreous, sometimes pyritaceous, or siliceous.

That with the circumference rounded and knotty, and the grooves transverse and flexuous, is met with in almost every part of the globe, in marble, limestone, clay, marble, swinstone, hornstone, agate, flint, &c. from the size of a sixpence to more than two feet in diameter. The chambers are often filled with crystals of various kinds.

The *N. belemnita* is found abundantly in many parts of England, particularly in Gloucestershire and Oxfordshire, and in most mountainous parts of Europe. They are more or less opaque or transparent, straight or a little bowed, cylindrical, conic, more or less clavate, fusiform, a little compressed, pointed or rather obtuse, with a groove or two towards the tip; internally hollow or filled up, from a quarter of an inch to eight inches long; the colour is whitish, amber, grey, brownish, or blackish. They are often inclosed in, or adhere to other stones, and are composed of several crusts encircling each other, and are most frequent in chalk, gravel, or clay. When burnt, or scraped with a knife, they give out an odour like rasped horn. Common people have a notion that they are to be found after a thunder-storm.

**CONI.** The *Conus* is to be met with in Piedmont, Switzerland, and Transylvania; and commonly it has a marble nucleus.

**PORCELLANITES.** The *Cypræa*, or *cowrie*, found marmoreous in Piedmont and Austria.

**BULLITES.**

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**BULLITES.** The *Bulla*, near Northberg in Germany.

**CYLINDRITES.** The *Voluta* has generally a marble nucleus, in Switzerland, Piedmont, near Verona, in Austria, Saxony, and Germany.

**BUCCHINI;** the *Buccinum* or *Whelk*. Of the several species of this, the angular or *B. bezoar* is found on the hills near Hampton in this country, in Switzerland, the Netherlands, and Germany.

**STROMBI.** The *Strombus chiragra* is found near Oedenburg in Hungary. *S. lucifer* with a long spire, near the warm bath in Wirtemberg.

**MURICIS.** Several species of the *Murex* or *whelk* is found fossil; the *M. granulatus* is met with in Italy and Austria. It is marmoreous, or filled with sandstone.

**TROCHILITES.** The *Turbo* is found in various species, in divers parts of Europe.

The *Turbo littoreus* in Switzerland, and many parts of Germany, sometimes filled with spar, or covered with arborescent figures.

Of the *Cancellate* tribe, the *T. striatulus* with an elongated spire is met with in England, France, Switzerland, and various parts of Germany, aggregate and fixed, generally in marble, flint, calcedon or sandstone, and sometimes filled with spar.

**HELICIS.** The *Helix* or *snail-shell* is met with in the fossil state, either *flattened*, in various parts of England, Belgium, Switzerland, Hungary, &c. detached or fixed, solitary or gregarious, or mixed, in marble, flint, or sandstone; or *rounded*, near Verona, in the Venetian territories, in Piedmont, Switzerland, and Germany; or *ovate*, in England, France, Switzerland, and Germany, in marble or sandstone.

**NERITES.** The *Nerita* is found in Piedmont, Switzerland, Carinthia, Austria, Germany, &c. and generally in limestone.

**AURICULARIS.** The *Haliotus*, or *sea-ear*, found in Belgium.

**PATELLARIÆ.** The *Limpet* is found in various parts of England, Switzerland, and Italy. The *P. saccharina* is common in various parts of Sweden.

**DENTALIS.** The *Dentahum*, or *tooth-shell*, found in various parts of Italy, Switzerland, Germany, Bohemia, Silesia, and Saxony, in marble, jasper, or calcedony.

**TUBULITES.** The *Serpula* is to be met with in many of the countries of Europe. The *flexuous* or *contorted*, called *vermiculites*, is found in Malta, Italy, Switzerland, Germany, Franconia, and Belgium, in marble, sandstone, generally seated on other petrified shells.

**TEREDINIS.** The *Teredo* is found in Sheppey island, and Piedmont, in subterraneous wood.

**SABELLÆ.** The *Sabella* is found every where among impressions.

**TUBIPORITES.** The *Tubipore* is met with in Sweden, Belgium, Franconia, and Silesia.

*T. musica* is found in England, Belgium, Germany, Gothland, in marble, quartz, or sandstone.

**MADREPORITES.** The *Madrepore* is found fossil in Gothland, Belgium, Piedmont, and the Venetian territories, in beds of marl. Of the forty-two species characterized by Gmelin, we shall only notice the following.

*M. turbinata*, found in Derbyshire, Gothland, Switzerland, Austria, and various parts of Germany and the Netherlands, in marble.

*M. porpita*, or *shirt-button madrepore*, in Switzerland, Austria, Saxony, and Westphalia, generally detached, in marble, jasper, and flint.

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*M. astroites*, in Oxfordshire, near Heddington and Witney, in the Netherlands, Germany, Austria, and Saxony, in chalk, calcedony, or sandstone.

*M. cæspitosa*, in Derbyshire, Switzerland, and various parts of Germany, in marble and flint.

**MILLEPORITES.** The petrified *Millepores* are found chiefly in Switzerland, Germany, and Sweden. *Milleporæ* do not appear to be nearly so frequently found in a mineral as in a recent state. Several fossils have been placed among the millepores, which Mr. Parkinson thinks should unquestionably rank with the madreporæ: such are the *M. simplex turbinata*, and the *M. simplex discoides* of Waller and Gefner.

**CELLEPORITES.** The *Cellepore* is found in Gothland, in marble or sandstone. *C. antipathes* and *C. gorgonia*, as fossils, are rather uncommon.

**ISIDIS;** the *Isis* or *coral*. Of this we may observe, that the simple joints of the *I. hippuris* are often found in England, Switzerland, and Sicily.

*I. entrocha* is found in England, and on almost every part of the continent, sometimes in single separate joints, sometimes connected together in a column, from the size of a pin's head to a finger's length, and of about the thickness of the middle finger; they are more or less transparent, in proportion as they contain more or less silica, are striated from the centre to the circumference, and have a cavity in the middle. When reduced to powder, they are esteemed very powerful diuretics, and are exhibited in nephritic cases; the dose being as much as will lie on a shilling.

*I. asteria*, or *star-stone*. Of this there are several varieties: the one denominated by Gmelin *b*, is orbicular at one end, and angular at the other, and is found in England, Switzerland, Germany, Austria, &c. single or gregarious, detached or fixed, with the joints solitary, or forming a column, which is rarely curved or branched, smooth or warty, rarely three or six-sided, very rarely square; the joints, when separated, resemble a radiated star: when thrown into strong vinegar, or acetous acid, they have the property of moving, which, however, is probably occasioned by the effervescence caused by the acid acting upon the calcareous matter of which they are composed.

**GORGONIÆ.** The *Gorgonia* is found in Switzerland, Italy, and Saxony, in the fossil state.

**ALCYONII.** The different specimens of the *Alcyonium*, in the fossil state, are found chiefly in Switzerland and Germany; but the *A. arboreum* is met with in England.

**SPONGIÆ.** Petrified sponge is found near Paffrath in Switzerland, and in Franconia.

**ESCHARITES.** The *Flustra* is found fossil in the Netherlands, Franconia, and Switzerland, in sandstone and calcareous soil.

**TUBULARIÆ.** The *Tubularia* is met with in Gothland and Switzerland.

**CORALLINÆ.** The *Coralline* is found in Bohemia and Venice.

**SERTULARIÆ.** The *Sertularia* is met with in France and the Netherlands.

**PENNATULÆ.** The *Pennatula* (or *sea-pen*) *phosphorea* is found in the Netherlands, and on mount Baldo in Verona.

*P. encrinus*, in its *expanded* state, is found in England and Germany, in marl or flint, sometimes the impression only: in the *contracted* state, called the *stone-lily*, it is found entire, or in parts, in England, Switzerland, Saxony, Germany, &c.

**PHYTLITHUS**, the last genus of the class Petrifications, includes

includes vegetables, or some of their parts, changed into a fossil substance. Of this there are six

## Species.

**TOTALIS**; the whole plant. Found in various parts of Great Britain, most commonly in the shale lying over strata of coals or in sandstone, and in various parts of Europe: it is always in the form of an impression; of the thirty-one varieties the following only claim notice.

The *Hippuris*, or mare's-tail, is found in the coal-mines of Silesia and Germany.

Various grasses are found in Switzerland, Bohemia, Silesia, and divers parts of Germany, in schistose swinestone and alumina lying over beds of coal, rarely in flint.

Stellate plants, as *Gallium*, *Asperula*, &c. in the coal-pits of England, France, and Germany.

The *Cactus*, in England, Westphalia, and Germany, in coal-mines.

The *Ornithopodium*, or bird's-foot, in the Veronese mountains of Venice.

The *Pinus*, or pine, in Switzerland and various parts of Westphalia.

Many genera and species of ferns are found in schistose and bituminous marl and alumina covering veins of coal, in sandstone and other fossils, in numerous varieties, in many parts of Great Britain, France, Germany, Italy, Bohemia, Saxony, and most parts of Europe, generally in impressions.

Various mosses and sea-weeds are met with in Venice, Saxony, and Silesia.

**RHIZOLITHUS**; the roots of vegetables, most commonly found underground in a state of decay, sometimes hollow, or filled with other fossil substances; sometimes covered with a stony crust; though sometimes they occur petrified in France, Italy, Germany, Sweden, and Siberia.

**TRUNCT.** The trunk or stalk of vegetables. The trunks of trees are found in almost every part of the globe, and in various states of decay and appearance; sometimes forming subterraneous woods, the pieces of which are found or carious, or perforated by the *Teredo*. Numerous specimens of these were dug up in forming the Highgate archway. Some are in a complete fossil state, and will admit of a high polish: others are converted into charcoal, with or without the bark, and often so perfect as to distinguish the kind, as oak, ash, fir, &c. Some of them are marmoreous and often filled with spar: of these, specimens are met with in Ireland and many parts of Germany: some in gypsum; some in silica; some in agate: these last are found in Siberia, Hungary, and Saxony, more or less opaque, breaking into coarse splinters or indeterminate fragments, a little shining, taking a fine polish, fibrous internally, of a conchoidal texture, variegated, spotted or striate, blackish or of a smoke colour, sometimes red, ochraceous or green: some are found in opal, in Upper Hungary, hardish, opaque or nearly so, breaking into indeterminate fragments or long splinters, separating into crusts, generally a little shining, mostly variegated with white, greyish-brown, or ochraceous and hyacinthine alternate streaks: some of these specimens are bituminous, which are found frequently forming entire subterraneous woods in various parts of England and Ireland, particularly in Lincolnshire: also in almost all the countries on the continent of Europe: in Prussia they are found in strata that are superincumbent on amber.

**LITHOPHYLUM**; the leaves of plants. Impressions of the leaves of various herbs and trees are very frequent in

marble, schist, marl, clay, and sandstone, rarely in flint or indurated oxyd of iron.

**ANTHOLITHUS**; the flowers of plants. Thus the spikes of grasses are found in Silesia, Franconia, and Germany, in copper ores, frequently with a small admixture of silver: the flowers of herbs, as the *galium*, *heliotropium*, *ranunculus*, and various ferns, are to be met with in England, Silesia, and Switzerland; impressions are found between slaty stones.

**CARPOLITHUS**; the naked seeds, seed-vessels, cones, nuts, drupas, and legumes of plants, are found in a fossil state in the coal-mines of England, in sandstone in Piedmont, in Bohemia in marl, in Switzerland in turf, in Hungary, Austria, &c. always in impressions.

The parts of vegetables confined in subterranean situations suffer, according to circumstances, either a complete revolution of composition, the lighter parts becoming volatilized, while the more fixed remain and form the substance which is termed *humus*; or, as it is supposed by Mr. Parkinson, it passes through another process which he considers as fermentative, and becomes bituminous. Wood thus changed is called *lignum fossile bituminosum*, and *Bovey-coal*. By the extension of this process, the same author supposes that the substances denominated bitumens (*naphtha*, *petroleum*, and *asphaltum*) are formed. To the same process he attributes the formation of amber. That jet, cannel coal, and common coal employed in domestic purposes, have had a vegetable origin, is rendered extremely probable, from the frequency with which they manifest the impressions of various vegetable bodies.

Thus the formation of the bituminous fossils may be satisfactorily explained, but by far the greater number of vegetable fossils, are of a lapideous nature, and necessarily owe their formation to very different processes, which may be preceded by the process by which bitumen is formed. Many bodies which are evidently of vegetable origin, may be now found existing in a lapideous, either calcareous, or silicious state; and many others are found possessing certain marks of the presence of some metallic substance. To explain these formations some persons have supposed the injection of the impregnating matter in a state of fluidity, by ignition, while others have imagined the gradual abstraction of the original particles of the body, and the regular deposition of the impregnating particles in the spaces which have been just left by the original matter. Mr. Parkinson attributes the formation of this description of fossils to the impregnation of vegetable substances, which have undergone different degrees of bituminization with water, holding the earths or the metals in solution. Thus with *lime* is formed calcareous wood, or the wood-marble of Oxfordshire and Dorsetshire, of Piedmont and Bohemia: with *silica* is formed the calcified, agatized, and jasperized wood; and with the addition of alumina, &c. the fossil woods which now partake of the nature of pitch-stone, &c. In other situations, metallic impregnations occur, as in such woods as are impregnated with pyrites of iron, so frequent in this country, and the beautiful woods of Siberia, containing the hydrate and carbonate of copper. For other particulars, and an account of the discovery lately made in the island of Guadeloupe, see the article **RELIQUE**.

**PETRIFYING WATERS.** Alonso Barba gives an account of some petrifying waters of Peru, which greatly exceed all those we have in Europe in the quantity of stony matter they contain. He tells us that they soon choke up their own passage by the stony matter they deposit there; and that all the cattle that drink of them die. He adds another

another story, which he probably took a little too hastily upon credit, which is, that they have moulds of the shape of our brick, which they fill with this water, and that on being exposed to the sun a few days, the water is wholly converted into a stone of the same shape; and that they build their houses and other buildings with these stones.

PETRIKOW, PETERKAU, or *Petrikow*, in *Geography*, a commercial, but not large, town of the duchy of Warsaw, in which the kings of Poland were formerly elected, and diets held. It has been twice consumed by fire; 48 miles E.S.E. of Siradia.—Also, a town of Lithuania; 130 miles S.E. of Novogrodek.

PETRILITE, or *Cubic Felspar of Karsten*, in *Mineralogy*, is the 40th species of the siliceous genus in the arrangement of Kirwan; its colour is reddish-brown or red; amorphous; its lustre 2; its transparency partly 2, partly 1; its fracture participates of the splintery and foliated, but inclines more to the former; its fragments 2; cubic, or inclining to that form, and without polished faces; it seems to consist of thick, indistinctly separate, straight, lamellar concretions; its hardness 9; brittle. The specific gravity of Kirwan's specimen was 3.081. At 160° it whitened, and barely concreted without any farther sign of fusion. As it is specifically different from the other stones hitherto called felspars, Kirwan, to prevent confusion, calls it petrilite.

PETRINAL, or POITRINAL, in *Artillery*, a kind of medium between the harquebuss and pistol, described by the president Fauchet, who lived under Francis I. and died under Henry IV. It had a very strong and quick wheel, and is supposed to have been invented by the bandouliers of the Pyrenean mountains. Nicot, in his Dictionary, describes it thus: "It is," says he, "a species of harquebuss, shorter than the musket, but of a greater calibre, and on account of its weight, is carried in a broad baudrick worn over the shoulder, and rested on the breast of the person who carries it, when he fires it, whence its name. The poitrinalier is the person who carries and uses the poitrinal." This arm is mentioned in the siege of Rouen by Henry IV. in 1592.

PETRINIA, in *Geography*, a strong town of Croatia, on the S. side of the Kulpa, built by Assan Pacha in 1592; 37 miles E. of Carlstadt. N. lat. 45° 32'. E. long. 16° 35'.—Also, a river of Croatia, which rises near Pusta Petrinia, and runs into the Kulpa near Petrinia.

PETRINIA, *Pusta*, a town of Croatia, near the source of the Petrinia; 10 miles S. of Petrinia.

PETRISKI, a lake of European Turkey, in Macedonia; 3 miles N.E. of Jenitza.

PETRIZZI, a town of Naples, in Calabria Ultra; 5 miles from Squillace.

PETROBRUSSLANS, in *Ecclesiastical History*, a religious sect, which arose in France, and the Netherlands, about the year 1110; so called from their leader, Peter de Bruys, a Provençal, who made the most laudable attempt to reform the abuses and remove the superstitions that disgraced the beautiful simplicity of the gospel; and after having engaged in his cause a great number of followers, during a laborious ministry of twenty years' continuance, was burnt in 1130, by an enraged populace, set on by the clergy. The chief of Bruys' adherents was a monk, one Henry; from whom the Petrobrussians were also called Henricians.

Peter the Venerable, abbot of Clugny, has an express treatise against the Petrobrussians; in the preface to which, he reduces their opinions to five heads.

1. They denied that children before the age of reason can be justified by baptism; in regard it is our own faith

that saves by baptism. 2. They held, that no churches should be built, but that those that already are should be pulled down; an inn being as proper for prayers as a temple, and a stable as an altar. 3. That the crosses ought to be pulled down, and burned, because we ought to abhor the instrument of our Saviour's passion. 4. That the real body and blood of Christ are not exhibited in the Eucharist but merely represented by their figures and symbols. 5. That sacrifices, alms, prayers, &c. do not avail the dead.

F. Langlois objects Manicheism to the Petrobrussians; and says, they maintained two gods, the one good, the other evil: but this we rather esteem an effect of his zeal for the Catholic cause, which determined him to blacken the adversaries of it, than any real sentiment of the Petrobrussians.

PETROCALLIS, in *Botany*, from *πέτρος*, a stone, or rock, and *καλλος*, beauty, a new genus, founded by Mr. R. Brown upon the *Draba pyrenaica* of authors, which owes the above appellation to its place of growth, and the decoration it affords to many an alpine precipice, of which a garden specimen can give but an inadequate idea. Brown in Ait. Hort. Kew. v. 4. 93.—Class and order, *Tetradynamia Siliculosa*. Nat. Ord. *Siliquose*, Linn. *Crucifera*, Juss.

Gen. Ch. *Cal.* Perianth of four elliptical, concave, slightly spreading, keeled, deciduous leaves, with a dilated, coloured margin. *Cor.* cruciform, of four obovate, spreading, slightly emarginate petals, twice the length of the calyx. *Stam.* Filaments six, awl-shaped, simple, about the length of the calyx, two opposite ones rather shorter; anthers simple, elliptical, incumbent. *Pist.* Germen superior, sessile, elliptical, compressed; style very short, angular; stigma small, capitate, flat. *Peric.* Pouch oval, compressed, entire, veiny, somewhat oblique, crowned with the permanent style, of two cells; the partition parallel to the valves, which are nearly flat. *Seeds* two in each cell, almost orbicular, flat, without a border, pendulous, their stalks capillary, attached to the partition.

Eff. Ch. Pouch oval, entire; its valves flattish. *Seeds* two in each cell, without a border, their capillary stalks attached to the parallel partition. Stamens without teeth.

1. *P. pyrenaica*. Pyrenean Rock-blossom. Ait. n. 1. (*Draba pyrenaica*; Linn. Sp. Pl. 896. Willd. Sp. Pl. v. 3. 428. Jacq. Austr. t. 228. Curt. Mag. t. 713.)—Native of the Pyrenees, as well as of the mountains of Dauphiny, always in the most elevated situations, flowering about the middle of summer. We have gathered it in seed upon Mount Cenis in August. In gardens it flowers in May, and may serve to adorn rock-work, but we doubt whether it will not require the shelter of a frame in winter. The stems form dense perennial tufts, and are much branched and leafy. Leaves crowded into a rose-like form, wedge-shaped, three-cleft half way down, obtuse, light green, shining, ribbed, fringed, not half an inch long, permanent though finally faded, and partly bleached. Flowers but few together, on solitary, corymbose, erect, hairy stalks; their petals at first white, but soon turning, like the edges of the calyx, to a rose-colour.

Though, in compliance with the ideas of our learned friend, we have adopted this genus, there seems but little pretence to separate it from *Draba*, with which the whole habit and appearance of the plant accord.

PETROCARYA, a name given by Schreber to the *Parinari* of Aublet, derived from *πέτρος*, a stone, and *καρυον*, a nut, in allusion to the remarkable hardness and solidity of the large stony seed. Schreb. 245. Willd. Sp. Pl. v. 2. 287. Mart. Mill. Dict. v. 3. (Parinarium; Juss. 342. Lamarck Illustr. t. 429. Parinari; Aubl. Guian. v. 1

514.)—Class and order, *Heptandria Monogynia*. Nat. Ord. *Hesperideæ*, Linn. *Rosaceæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, turbinate, five-cleft; its segments ovate, acute, rigid, spreading. *Cor.* Petals five, ovate, acute, unequal, smaller than the teeth of the calyx, and alternate with them. *Stam.* Filaments fourteen, capillary, longer than the teeth of the calyx, and inserted into its rim within the petals, seven of them, all on one side of the calyx barren; anthers seven only, roundish, bursting at the inner side. *Pist.* Germen in the bottom of the calyx, ovate, villous; style cylindrical, incurved, villous, longer than the stamens; stigma capitate. *Peric.* Drupa large, ovate, compressed, its flesh fibrous; of one cell. *Seed.* Nut ovate, compressed, longitudinally furrowed, with unequal wrinkles and tubercles, of two cells, its shell very hard and almost stony, not bursting; kernels foliary, oblong.

Ess. Ch. Calyx five-cleft. Petals five, inserted into the calyx. Seven of the stamens abortive. Drupa fibrous. Nut rugged, of two cells.

1. *P. montana*. Willd. n. 1. (*Parinari montana*; Aubl. Guian. v. 1. 514. t. 204. 205.)—Leaves ovate, on hairy stalks.—Gathered by Aublet in the woods of Guiana, forty miles from the sea-coast, flowering in May, and bearing ripe fruit in August, the nuts of which are sweet, and excellent eating. The trunk of the tree is twenty-four feet high, and two or three in diameter, crowned with many spreading branches, which are clothed when young with rusty down. Leaves alternate, on thick downy stalks about half an inch long, oval, pointed, entire, coriaceous, four or five inches in length, and nearly one and a half in breadth, with one rib, and numerous, parallel, transverse veins; their upper surface smooth and shining; the under white and finely cottony, with reticulated prominent veins. *Stipulas* in pairs, sheathing, lanceolate, concave, externally downy, above an inch long, deciduous. *Flowers* rather small, whitish, numerous, in dense, terminal, forked, downy and hairy panicles, with two or three large ovate bractæ at each subdivision. *Drupa* green, acid, four inches long, and three in its greatest diameter.

2. *P. campestris*. Willd. n. 2. (*Parinari campestris*; Aubl. Guian. v. 1. 517. t. 206.)—Leaves heart-shaped, nearly sessile.—Native of the forests of Guiana, in the quarter of Timoutou; as well as of the island of Mauritius, in the quarter of Moka. *Aubl.* Differs from the last in the broader and heart-shaped figure of the leaves, as well as in the very short footstalks, and much smaller size of the fruit, which is scarcely an inch and half long, with very acute points and angles to the shell of its nut, which is as hard as the former, and its kernels are likewise eatable. This fruit is known among the Creoles by the name of *Nesle*, or *Medlar*. Its flesh is pulpy and acid. Its season, as well as that of the flowers, is June. By Aublet's specimens of these plants, one would almost suspect them to be varieties, so exactly do all their parts accord in texture and appearance. Their fruits indeed are very different in size, and their footstalks in length.

Jussieu mentions two other species, observed by him amongst Adanson's specimens from Senegal, called *Mampata* and *Neou*, whose nuts however are ovate, and less furrowed or wreathed, their stamens apparently fifteen, three opposite to each segment of the calyx. See MAMPATA.

PETROCOSSYPHUS, in *Ornithology*, a name given by some authors to the bird more usually called from its colour the *ceruleus*.

It lives among the rocks, in woody mountains, and sings very sweetly. It is a variety of the *Lanius infaustus*.

PETROJOANNITES, in *Ecclesiastical History*, the followers of Peter John, or Peter Joannis, i. e. Peter the son of John, who lived in the twelfth century; whose doctrine was not known till after his death; when his body was taken out of his grave, and burnt. His opinions were, that he alone had the knowledge of the true sense wherein the apostles preached the gospel; that the reasonable soul is not the form of man; that there is no grace infused by baptism; and that Jesus Christ was pierced with a lance on the cross before he expired.

PETROL, or PETROLEUM, in *Chemistry*, a fluid substance, resembling in a high degree the essential oils from vegetables. It is of a brownish-yellow colour, of a peculiar odour. Its specific gravity varies from .73 to .878. When exposed to a gentle heat for distillation, the fluid which comes over has less colour, is much thinner, and has more smell. In this state it is called naphtha. It burns with a white flame, and is employed in the vicinity of the Caspian sea for lamps. The earths in these parts are sometimes so saturated with it as to be rendered inflammable.

When it is exposed to the air, even that obtained by distillation, it becomes thick and highly coloured, and puts on the form of bitumen. This no doubt is occasioned by the gradual diminution of its hydrogen, by the oxygen of the atmosphere.

It is soluble in alcohol and ether, and combines with the fixed and volatile oils. It is hence used to dissolve resinous bodies and bitumen, and might, in many cases, answer the purposes of oil of turpentine.

It is found in different states. According as it has had access to the air, it will thicken and become of a darker colour. See NAPHTHA and BITUMEN.

The more fluid petrolea, says Dr. Lewis, have been distinguished by the name of *naphtha*; and the thicker by those of *pissasphaltum* and *pisselaun*.

These, according to all appearance, must be the work of subterraneous fires, which raise or sublime the more subtle parts of certain bituminous matters that lie in their way.

These parts, being condensed into a liquor by the cold of the vaults of rocks, are there collected, and ooze thence through clefts and apertures, with which the disposition of the ground furnishes them.

Petrol, then, is a liquid bitumen, only differing by its liquidity from other bitumens, as asphaltum, jet, amber, and the like substances.

The naphtha, which is either a liquid, or at least a very soft bitumen, is nearly allied to petrol.

Hitherto there has been little petrol found, except in hot countries. Olearius says, he saw above thirty springs of it near Scamachia, in Persia. (See PERSIA.) There are also petrels in the southern provinces of France; but the best are those in the duchy of Modena, first discovered by Ariosto, a physician, in 1640, in a very barren valley, twelve leagues from the city of Modena.

Three canals are there dug with great expence in the rock; by which three different kinds of petrol are discharged into little basons or reservoirs: the first, as white, clear, and fluid as water, of a brisk penetrating smell, and not disagreeable; the second of a bright yellow, less fluid, and of a less brisk smell than the white; the third of a blackish red, of thicker consistence, and a smell more approaching that of bitumen.

There are many varieties of these oils in regard to colour, fluidity, subtility, and the pungency of their smell, and taste; the most fluid are, in general, the most subtle and pungent. With us they are commonly sophisticated.

Mr. Boulduc made several experiments with the petroleum of Modena, an account of which he gave to the Paris Academy.

It easily took fire on being brought near a candle, and that without immediately touching the flame; and when heated in any vessel, it will attract the flame of a candle, though placed at a great height above the vessel, and the vapour it sends up taking fire, the flame will be communicated to the vessel of heated liquor, and the whole will be consumed. It burns in the water, and when mixed with any liquor, swims on the surface of it, even of the highest rectified spirit of wine, which is one-seventh heavier than pure petroleum. It readily mixes with all the essential oils of vegetables, as oil of lavender, turpentine, and the rest, and seems very much of their nature: nor is this very strange, since the alliance between these bodies is probably nearer than is imagined, as the essential oils of vegetables may have been originally mineral ones, and drawn up out of the earth into the vessels of the plant.

Petroleum, when shaken, yields a few bubbles; but they sooner subside than in almost any other liquor, and the liquor resumes its clear state again almost immediately. This seems owing to the air in this fluid being very equally distributed in all its parts, and the liquor being composed of particles very evenly and nicely arranged.

The extensibility of this oil is also amazing. A drop of it will spread over several feet of water, and in this condition it gives a great variety of colours, that is, the several parts of which this thin film is composed, act as so many prisms.

The most severe frost never congeals petroleum into ice, and paper wetted with it becomes transparent, as when wetted with oil; but it does not continue so, the paper becoming opaque again in a few minutes, as the oil dries away.

Spirit of wine, which is the great dissolvent of sulphur, has no effect upon petroleum, not even with ever so long a digestion. It will not take fire with the dephlegmated acid spirits, as oil of cloves and other of the vegetable essential oils do: and in distillation, either by balneum Mariæ, or in sand, it will neither yield phlegm nor acid spirit; but the oil itself rises in its own form, leaving in the retort only a little matter, thick as honey, and of a brownish colour. Whoever, therefore, would use this oil in medicine, must take it as nature has prepared it, art having no power to make any alteration in it. Mem. Acad. Paris, 1715.

It is remarkable, that all the petroleum got from the lake of mount Ciaro in Italy is white, whereas that of Modena is yellow, and that of Parma brown. These wells or holes continue to furnish the oil in different quantities for a considerable time, and, when they will yield no more, they pierce the slates in some other place. Mem. Acad. Scienc. Par. 1736.

The petroleum wells of the Birman empire, situated about five miles E. of Yaynangheoum, or Petroleum creek, on the Irrawaddy, supply the whole empire, and many parts of India, with this useful product. The mouth of the creek, when captain Symes visited it, was crowded with large boats, waiting to receive a lading of oil; and immense pyramids of earthen jars were raised within and round the village, disposed in the same manner as shot and shells are piled in an arsenal. This place is inhabited only by potters, who carry on an extensive manufactory: the smell of the oil is said to have been extremely offensive. (Symes's Embassy to Ava, vol. ii.) Of the wells in this district there

are said to be 520, which yield, annually, more than 400,000 hogheads of petroleum.

PETROLEUM *Barbadoense*, *Barbadoes tar*, a species of *bitumen*, for an account of which, see BITUMEN. Petroleum is a stimulating antispasmodic and fudorific; and as such it has been given in asthma and coughs, unattended with inflammation, but it is chiefly used for external purposes, as a stimulant in diseases of the hip-joint, rheumatic, and other chronic pains, chilblains, and to paralytic limbs, applied by friction. It is, however, scarcely ever employed in either way, and on this account is not often to be procured in the shops. The dose of petroleum may be from  $\eta$ ℥ to  $\mathfrak{z}$ ℥s, in any convenient vehicle. In the West Indies the Barbadoes tar is used both as an internal remedy and an external application, in the same cases.

PETROLEUM *Creek*, in *Geography*, a river of America, which runs into the Ohio, N. lat.  $40^{\circ} 24'$ . W. long.  $80^{\circ} 40'$ .

PETROMARULA, in *Botany*, a name given by several authors to the pyramidal rapunculus of the island of Crete, called by Mr. Tournefort, *rapunculus Creticus seu pyramidalis alter*.

PETROMYZON, *the Lamprey*, in *Ichthyology*, a genus of fishes of the order Chondropterigios, according to the Linnæan system, but in the arrangement of Shaw and others, it belongs to the Cartilaginous order. The name is originally Greek, and is derived from the words  $\pi\epsilon\tau\rho\alpha$ , a stone, and  $\mu\upsilon\zeta\omega$ , to suck; this fish being usually found in rivers, adhering to the stones by sucking, and so keeping its place. The generic character is as follows. The head is slenderer than the body; the mouth longer above than beneath; the teeth are orange-coloured, hollow within, and surrounded with a fleshy margin; above it is a little curved, broad beneath; it has seven spiracles on each side the neck; on the nape a fitulous opening; it has neither pectoral nor ventral fins. According to the last edition of Gmelin, there are only four species, but Dr. Shaw enumerates nine: we shall notice them all, taking first those referred to by Gmelin. They all adhere to rocks, and other bodies by the mouth, the edges of which are jagged; the body is eel-shaped, slippery, and mucous; they live a long time out of the water, and feed on worms, insects, lesser fish, and dead bodies; the belly is long, and narrow; the vent is near the pinnate tail. They have two dorsal fins; round the eyes are numerous perforations; the tongue is femilunar and hard; the teeth ferrate.

#### Species.

\* MARINUS; True Lamprey. Mouth papillous within; second dorsal fin is distinct from the tail. In its general appearance this fish makes a near approach to the eel tribe, and particularly to the MURENA genus; which see. It arrives at a considerable size, and to the length of more than three feet: the generality of the British specimens, however, are not so large. The usual colour of the lamprey is a dull-brownish olive, clouded with yellowish-white variegations; the back, as in most fishes, is darker than the other parts, and the abdomen paler; the fins are tinged with dull orange, and the tail with blue; the eyes are rather small; the mouth large, oval, situated beneath, deeply concave, and lined or paved, as it were, with several circular rows of sharp, triangular, orange-coloured teeth; the tongue, which is short and crescent-shaped, is also furnished with a row of very small teeth round its edge; on the top of the head is a small orifice or spout-hole, through which is discharged the superfluous water taken in at the mouth and gills; near each eye are two rows of much smaller

## PETROMYZON.

smaller foramina, one row consisting of five, and the other of six; these are supposed to be the orifices of the glands which secrete the viscid moisture necessary for lubricating the skin; on each side the neck, commencing at a small distance beyond the eyes, is a row of seven pretty large, equidistant, round spiracles or breathing-holes, each leading to a deep sacculus, lying in an oblique direction towards the head: these seven sacculi on each side are lined with a red plaited membrane, and have no communication with each other, but pass by their respective double ducts to the inside of the mouth: towards the lower part of the back commences the first dorsal fin, which is rather shallow, with a rounded outline; the second, which commences at a very small distance from it, is nearly of the same extent, but with a subtriangular outline; the tail is short and slightly rounded.

The lamprey is an inhabitant of the ocean, ascending rivers chiefly during the latter end of winter and the early months of spring; and after a residence of a few months in fresh water, again returns to the sea: it is viviparous, and the young are observed to be of slow growth; contrary to the assertions of some writers, who have supposed the lamprey to be a short-lived fish. When in motion this fish is observed to swim with considerable vigour and rapidity, but it is more commonly seen attached by the mouth to some large stone or other substance, the body hanging at rest, or obeying the motion of the current: so strong is the power of adhesion exerted by this animal, that a stone of the weight of more than twelve pounds may be raised without forcing the fish to forego its hold. The general habits of the lamprey seem pretty much to resemble those of the eel, and it is supposed to live principally on worms and young fish. Like the eel it is remarkably tenacious of life; the several parts, when cut in pieces, will long continue to move; and the head will strongly attach itself, for several hours, to a stone, though by far the greater part of the body be cut away from it.

Among the cartilaginous fishes none is so destitute of all appearance of real bone as the lamprey, in which the spine itself is no other than a mere soft cartilage, without any processes or protuberances whatsoever. Among other particulars in its anatomy, it is remarkable that the heart, instead of being inclosed in a soft pericardium, as in other animals, is guarded by a strong cartilaginous one: the liver, which is of an oblong form, is of a fine grass-green colour, somewhat deeper in the female fish, and may be used for the purpose of a pigment.

A vulgar error, arising from inattentive inspection, and total ignorance of the nature of the animal, is said sometimes to prevail; viz. that the lamprey is furnished with nine eyes on each side: as an article of food, the lamprey has, for many ages, maintained its credit as an exquisite dainty; and has uniformly made its appearance at the most splendid of our ancient entertainments. The death of king Henry I., it is well known, is attributed to a too luxurious indulgence in this his favourite dish. It still continues to be in high esteem, and we are told by Mr. Pennant, that the city of Gloucester continues to send yearly, at Christmas, a present of a rich lamprey pyc to the king. It sometimes happens that the lampries at that season are so rare, that a guinea is demanded for the price of a single fish. They are most in season during March, April, and May, and are observed to be much more firm when just arrived from sea than when they have been a considerable time in fresh water. They are found in several of the British rivers, but that which is most celebrated for them is the Severn. In the mouths of some of the larger European rivers they

are sometimes taken in such quantities, that it is impossible to use them in their fresh state; they are therefore grilled and moderately salted, and afterwards barrelled up for sale, with the addition of vinegar and spices.

\* *FLUVIATILIS*; Lesser Lamprey. Second dorsal fin angulate. The head is greenish; behind the row of lesser teeth there are larger ones; above there are seven connected together, and beneath two distant; the eyes are small, the iris golden; towards the head is the appearance of a lateral line; the fins are of a violet colour. This species is, according to Dr. Bloch, an inhabitant of the sea, and ascends, in spring time, most of the European rivers, in which it is found more frequently and plentifully than the great lamprey. With us it is found in considerable quantities in the Thames, the Severn, and the Dee. Vast numbers are taken and sold to the Dutch as baits for their cod and turbot fisheries. In the river Baulster, in Courland, great quantities are taken from beneath the ice with nets; they are much larger than those found elsewhere, and are packed in snow, and sent to any distance; and when put into cold water they will recover. This species spawns in March and April, and it is a very prolific fish.

*BRANCHIALIS*; Pale Lamprey, or Lampren: by Pennant it is named Pride. The specific character is, second dorsal fin linear; mouth lobate. The mouth is without teeth; the fins are scarcely a line broad; the tail is lanceolate, sharp at the end. It inhabits the fresh-water rivers of Europe, particularly the Isis, near Oxford; it is six or seven inches long; conceals itself under stones or in the mud, and does not adhere to stones like the others; the body is round, tapering to each end, annulate, above greenish, yellowish at the sides, beneath white. This was first distinctly described as an English species by Dr. Plot in his History of Oxfordshire.

*PLANERI*. Body annulate; mouth papillous; the length of this fish is from five to ten inches; it has a general resemblance to that of the lampren-colour olive, pale or white beneath; the second dorsal fin has an angular outline; the tail is shaped like that of the lamprey or lampren; the mouth is furnished with small teeth; native of the rivers of Thuringia, and other parts of the German empire; like most of the genus it is tenacious of life, living for the space of a quarter of an hour when inclosed in spirits of wine. This was first observed and described by professor Planer, of Erford. Hence it is called Planer's lamprey.

*RUBER*; Red Lamprey, specifically described as having a brownish back. Its general appearance is that of the minute lamprey; the colour is red, deepest about the gills or respiratory foramina; the upper parts are tinged with a dusky hue. It is found in the Seine, where it was observed by M. Noel, who sent it to the count de Cepede.

*SANGUISUGA*; Leech Lamprey. Characterised by its large mouth, very small orange-coloured teeth, and shallow fins; the body is cylindric; the mouth very wide; teeth very numerous, orange-coloured, and a semi-circular range of nine double teeth near the throat. It has been found in the Seine, and in many points it so nearly resembles the common lamprey as to leave a suspicion that it was the young of that species, but M. Noel was convinced of its being specifically different: it is said to be found only at those times in which the shad, *CLUPEA Alosa*, (which see,) is in the river: these fishes it persecutes, by fastening beneath their bellies, and sucking their blood with the avidity of a leech; its body being constantly found full of that fluid: they sometimes attack salmon in a similar manner.

*ARGENTUS*; Silvery Lamprey. This has a bright silvery

very body, and a slightly yellowish back; the mouth is large; the teeth orange-coloured, and situated in the fore part of the mouth; the eyes are very large, with silvery irides; both the dorsal fins are very shallow, and without any angular outline; the lateral line is very distinct; the tail is lanceolate. It is a native of the Indian seas.

**PLUMBEUS**; Lead-coloured Lamprey. Yellowish-white beneath, with spatule-shaped tail. The body of this fish decreases from head to tail in a conical manner, the mouth is large, the dorsal fins rounded. It has been seen in the Seine, where it is rather plentiful.

**BICOLOR**; Brilliant Lamprey. This species is easily distinguished by its colours, the upper part being of a fine black, and the under of a brilliant silver colour; the mouth is very small; both the dorsal fins are round, and each nearly as short as the caudal, which is spatule-shaped: it is found in the Seine, in considerable quantities.

**PETRONA**, in *Geography*, a town of Croatia; 14 miles N. of Carlstadt.

**PETRONEL**, a sort of harquebuss, or hand-gun.

**PETRONEL**, or *Poirinal*. See **PETRINAL**.

**PETRONELL**, in *Geography*, a town of Austria; 7 miles N.E. of Brugg.

**PETRONELLUS**, in *Ornithology*, a name under which some have described the bunting, or *EMBERIZA Miliaria*; which see.

**PETRONIA**, a species of *Fringilla*; which see.

**PETRONIA Marina**, the name of a small bird of the *œnanthe* kind, or nearly allied to that genus. Its beak is strong and sharp, like that of the chaffinch; its head is a brownish-grey, but has usually a long whitish streak running along it; its neck is ash-coloured, and at the bottom is variegated with black; the rump is of a brownish-green; the long wing-feathers are blackish; with edges and tips of green, and are white underneath; the breast is of a dusky white, and the tail brownish, variegated with yellow. It is, however, distinguished from all other birds by a fine large yellow spot, which it has on the middle of its throat.

**PETRONIUS**, **ARBITER**, in *Biography*, the author of a Latin work entitled "Satiricon," which has come down to modern times in a very imperfect state, is commonly supposed to be the same person as A. Petronius, mentioned by Tacitus in the 16th book of his *Annals*, under the reign of Nero, as a favourite of that tyrant, and at length a victim to his suspicion: "He was one," says that historian, "who passed his days in sleep, and his nights in business and pleasure: and as others acquire celebrity by active exertions, he obtained it by his indolence. He was regarded not as a common debauchee and spendthrift, but as a proficient in studied luxury; and his words and actions, the more they were marked with an air of carelessness and negligence, the more they pleased, as denoting a simplicity of character. In the station of proconsul of Bithynia, and afterwards of consul, he displayed vigour and talents for public business, but relapsing into vicious habits, or, at least, affecting it, he was received among the few intimates of Nero as the director of his pleasures; and the emperor considered nothing as peculiarly delicate and refined, which had not the approbation of Petronius." This degree of favour proved fatal to him: it excited the envy of Tigellinus, who accused him to Nero, as being the friend of one of the persons condemned for a conspiracy. He was detained in custody at Cumæ, where, impatient of the suspense between hope and fear, he opened his veins, and died. This was in the year 66: he sent as a last legacy to the emperor a sealed paper, reproaching him with his infamous and unnatural debaucheries.

It is a matter of considerable doubt, whether it was this Petronius who was author of the "Satiricon;" for while its contents are not at all unsuitable to a man of such a character, the style and circumstances have been more appropriate to a later period of Roman literature. "The work itself," says an able critic, "is a farrago of verse and prose, of topics and stories, serious and ludicrous, intermixed with the most detestable obscenity, and so mutilated, that no connection can be made out." It has been thought that some of the scenes in it were intended as a satire against Nero, written by Petronius in his last moments. A new fragment was discovered at Traw, in Dalmatia, and published in 1664: its genuineness was warmly discussed among critics, but it has generally obtained an admission among the rest. The difficulties of this author, and, it is probable, the nature of his subjects, have caused him to be much studied by the curious literati, and have produced numerous editors and commentators, chiefly French, German, and Dutch; but says the critic already referred to, "it is to the credit of England that none of her scholars have contaminated themselves with the attempt to elucidate him." The most elaborate edition is that of Burmann, in 1709, 2 vols. 4to. Moreri. Gen. Biog.

**PETROPAVLOVSKAIA**, in *Geography*, a fort of Russia, in the government of Irkutsk; 16 miles W.S.W. of Selenginsk.—Also, a fort of Russia, in the government of Upha; 52 miles E.N.E. of Verehouralsk. See also **St. PAUL** and **St. Peter**.

**PETROPAVLOVSKOI**, a town of Russia, in the government of Tobolsk, on the Ischim; 40 miles E. of Ischim.

**PETRO-PHARYNGEUS**, in *Anatomy*, a name given by Winslow to some fibres of the constrictor pharyngis superior.

**PETROPHILA**, in *Botany*, so named by Mr. R. Brown, from *πέτρος*, a stone, and *φιλεω*, to love, because the shrubs of this genus are always found in rocky exposed situations. Brown Tr. of Linn. Soc. v. 10. 67. Prodr. Nov. Holl. v. 1. 363. Ait. Hort. Kew. v. 1. 186.—Class and order, *Tetrandria Monogynia*. Nat. Ord. *Aggregatae*, Linn. *Proteaceæ*, Juss.

Gen. Ch. *Cal.* none. *Cor.* of four petals, linear, cohering at their base, somewhat dilated and concave at the summit, and falling off together. *Stam.* Filaments four, short, inserted towards the summit of each petal; anthers erect, oblong, two-celled, lodged in the cavities of the petals. *Pist.* Germen superior, small, compressed, without scales at the base; style cylindrical, rigid, permanent at the base; stigma spindle-shaped, taper-pointed. *Peric.* none. *Seed.* Nut lenticular, crowned with the base of the style, sessile, hairy, either on one side or at the base only. *Eff.* Ch. Petals four, cohering below, falling off entire. Anthers in the hollows of the petals. No scales under the germen. Stigma spindle-shaped, pointed. Nut compressed, crowned with the permanent base of the style, and partly hairy.

The habit is rigid and shrubby. *Leaves* smooth, various, either thread-shaped or flat, undivided, lobed or pinnatifid, sometimes differing on the same individual. *Flowers* in dense spikes, with a scale-like *bractea* to each, which is permanent and finally hardened, so that the inflorescence assumes the nature of a *strobilus* or cone; yet analogy, and the presence of a corolla, forbid us to consider these spikes as catkins. Mr. Brown defines ten species in his *Prodromus*, chiefly the produce of dry heathy and stony ground, on the southern coast of New Holland. The two following are known in our gardens.

*P. pulchella*.

*P. pulchella*. Fennel-leaved Petrophila. Brown n. 5. (*Protea pulchella*; Willd. Sp. Pl. v. 1. 507. Schrad. Sert. Hannov. t. 7. Curt. Mag. t. 796. Cavan. Ic. v. 6. 33. t. 550.)—Leaves doubly pinnatifid, cylindrical, erect. Petals silky; downy at the point.—Native of New South Wales, from whence it is said by Mr. Aiton to have been introduced by Sir Joseph Banks, about the year 1790. It is a green-house shrub, flowering in July and August. The leaves are glaucous, resembling those of fennel, but shorter, thicker, and more rigid. Spikes terminal, sometimes aggregate, cylindrical, of numerous, crowded, inodorous, white flowers, with yellow anthers.

*P. diversifolia*. Various-leaved Petrophila. Brown n. 8.—Leaves doubly or triply pinnate, flat; their segments pointed. Petals bearded. Spikes axillary, stalked. Bractees woolly, combined.—Native of Lewin's land, from whence it was sent to Kew in 1803, by Mr. Peter Good, but has not yet flowered. The nut is said to be thin, leafy and dilated.

We still feel much disposed to unite *ISOPOGON*, see that article, with *Petrophila*, as forming one natural genus, for which we would retain the latter name; yet Mr. Brown hints an inclination even to subdivide both genera. There are two ways of viewing every subject. Very acute and laborious observers naturally incline to make nice and multiplied distinctions. It requires a peculiar talent to combine without confounding; and to judge, by taking enlarged views of the matter, what genera are founded in nature, which is perhaps the most difficult part of the philosophy of natural history.

**PETROPSKOI**, in *Geography*, a town of Russia, in the government of Perm; 56 miles E.S.E. of Krasnouphimik.

**PETRO-SALPINGO-STAPHYLINUS**, in *Anatomy*, the name given by Winslow to the levator palati mollis muscle.

**PETROSELINUM**, in *Botany*, from *πέτρος*, a stone, and *σέλινον*, parsley, appears, by the description in Dioscorides, to be a plant of the umbelliferous order, which, according to him, was originally found on rocky precipices in Macedonia. The early commentators have differed concerning it, in the usual cause, of seeking the plants of ancient Greece, in the narrow limits of their own neighbourhood. Thus Fuchsius supposed our *Sison Amomum* to be the *πέτροσέλινον*, whilst Lobel and others, conversant with gardens, have, with more probability, fixed upon *Bubon macedonicum*. Linnæus retains the above word as the specific name of the common Garden Parsley, *Apium Petroselinum*; which is unquestionably the *σέλινον* of Dioscorides, spoken of by him as a garden plant. Dr. Sibthorp thought the same plant in a wild state, growing on rocky mountains and precipices, might be the *πέτροσέλινον* of that ancient author; but we find little to countenance such an opinion. The decision of Linnæus is supported merely by that of various preceding writers, cited under *Apium hortense*, in Bauhin's Pinax, 153. These were chiefly early German botanists, to whom *Bubon macedonicum* was probably unknown, and who merely fixed on any plant that, in the narrow range of their acquaintance, answered best to the description of Dioscorides. It is thus that many ancient synonyms have become misapplied, which, by long use, are now but too firmly established in their erroneous acceptance.

**PETROSELINUM Macedonicum**, in the *Materia Medica*, the name of a seed used in medicine.

**PETROSILEX**, **HORNSTONE**, in *Mineralogy*, a species of the siliceous genus. Its colour is commonly dark blue, yellowish, or pearl-grey, sometimes yellowish-white, flesh

or brownish red, or mountain blue, or blackish-brown, or greenish-brown, or dark green, or olive-green, often variegated. Amorphous for the most part, but lately found crystallized by Mr. Beyer in Schneeberg, either in hexahedral prisms, or in double triangular pyramids, or cubic or hexahedral plates; the surface of these crystals being mostly rough and uneven, some hollow, some solid, sometimes as thin as paper. Its lustre, 0: transparency, 1.2: the crystallized sometimes 0. Its fracture generally splintery, more rarely conchoidal, sometimes from the fine splintery passing into the even, but of a coarser grain than flint: fragments, 2.3: hardness, from 7 to 9: specific gravity, from 2.532 to 2.653. Mr. Bergman counts this stone among those that are fusible *per se*, even by a blowpipe: but Mr. Kirwan, after many trials, found only one that gave any sign of fusion: but they most frequently decrepitate and whiten. M. Saussure found the hornstones of Switzerland generally infusible; and only those lying in calcareous strata to be fusible in a high degree of heat. Of the hornstone there are many varieties. The hornstones are frequently found in a state of decomposition. Its transitions are into flint, calcedony, chrysoprasium, jasper, quartz, opal, siliceous schistus, argillite, toadstone, and even into granular limestone, and indurated clay.

Hornstone differs from jasper, often by its splintery fracture; always by its transparency, though imperfect, and want of lustre:—from flints, by its fracture, dulness, and hardness; but when its fracture happens to be conchoidal, by its dulness, less transparency, and hardness:—from quartz, by its dulness and inferior hardness:—from serpentine, generally in hardness, specific gravity, and fusibility:—from heliotropium, by the aggregate of its properties. The hornstone, being a greenish-white, with reddish spots, from Lorraine, whose specific gravity was 2.532, fracture conchoidal, lustre 0, hardness 10, whitening and becoming brittle at 127°, and melting at 144° into a semitransparent compact enamel, was analysed by Mr. Kirwan; and found to contain 72 per cent. silica, about 22 argill, and about six, or rather more, of mild calcareous earth. The infusible hornstones probably contain no calx, or less. The schistose hornstone has three varieties, *viz.* siliceous schistus, Lydian stone, and hornslate. Kirwan's Mineralogy.

**PETROSUM SAL**, in *Natural History*, a name given by some of the old writers to the nitre of Ægypt, used in the ancient times: and by others to the common nitre, which we use at present, and call by a similar name, *salsipetre*.

**PETROVATZ**, in *Geography*, a town of Croatia; 22 miles S.S.E. of Carlstadt.

**PETROUS PORTION**, in *Anatomy*, a part of the temporal bone, so called from its irregular surface. See **CRAanium**.

**PETROVSK**, in *Geography*, a town of Russia, in the government of Jaroslavl; 52 miles S. of Jaroslavl. N. lat. 56° 45'. E. long. 40° 14'.—Also, a town of Russia, in the government of Saratov, on the Medveditza; 40 miles N.W. of Saratov. N. lat. 52° 40'. E. long. 44° 54'.

**PETROVSKAIA**, a town and fort of Russia, situated on a bay of the sea of Azof, or Azoph, with a harbour, 24 miles S.W. of Mariupol.—Also, a bay on the N. coast of Russia, in the Frozen ocean. N. lat. 76° 10'. E. long. 106° 14'.

**PETROWITZ**, a town of Bohemia, in the circle of Koniggratz; 8 miles E.N.E. of Koniggratz.—Also, a town of Bohemia, in the circle of Moldau; 6 miles S. of Seltchan.

**PETROW.**

**PETROWNAH**, a town of Hindoostan, in Bahar; 28 miles S.S.W. of Patna.

**PETROZAVODSK**, a town of Russia, in the government of Olonetz, on the W. coast of the Oneskoe lake; 132 miles N.E. of Petersburg. N. lat.  $61^{\circ} 40'$ . E. long.  $34^{\circ} 14'$ .

**PETSCHAKEN**, a town of Bohemia, in the circle of Bechin; 8 miles S. of Pilgram.

**PETSCHANOI**, a fort of Russia, in the government of Kolivan; 188 miles W.S.W. of Kolivan. N. lat.  $53^{\circ}$ . E. long.  $76^{\circ} 34'$ .—Also, a cape on the north coast of Russia, in the Frozen sea. N. lat.  $75^{\circ} 25'$ . E. long.  $165^{\circ} 14'$ .

**PETSCHNECZA**, a town of the duchy of Carinthia; 12 miles S.W. of Clagenfurt.

**PETSKA**, a town of Bohemia, in the circle of Königgratz; 11 miles E.N.E. of Getfchin.

**PETSKAU**, a town of Bohemia, in the circle of Saatz; 22 miles E. of Eger. N. lat.  $50^{\circ} 4'$ . E. long.  $12^{\circ} 55'$ .

**PETSMO**, a small island on the E. side of the gulf of Bothnia. N. lat.  $63^{\circ} 14'$ . E. long.  $21^{\circ} 33'$ .

**PETTAL**, a town of Hindoostan, in Madura; 10 miles E. of Coilpetta.

**PETTAPOLLY**, a town of Hindoostan, in the circle of Guntoor, situated on the coast of Bengal; 42 miles S.W. of Masulipatam.

**PETTAPOUR**, a town of Hindoostan, in the circle of Rajamundry; 30 miles N.N.E. of Rajamundry.—Also, a town of Hindoostan, in Guzerat; 12 miles N.W. of Amedabad.

**PETTAW**, a town of the duchy of Stiria, on the Drave, containing one parish church, and three cloisters. This is an ancient place, as it is frequently mentioned both by Roman as well as other authors of antiquity. Its manufactures are considerable; 13 miles E.S.E. of Marpur. N. lat.  $46^{\circ} 34'$ . E. long.  $15^{\circ} 53'$ .

**PETTEIA**, Πετεΐα, in the *Ancient Music*, a Greek term to which we have no corresponding one in our language.

The melopœia, *i. e.* the art of arranging sounds in succession, so as to make melody, is divided into three parts, which the Greeks call *lepsis*, *mixis*, and *chresis*; the Latins *sumptio*, *mixtio*, and *usus*; and the Italians *presa*, *mescolamento*, and *uso*. The last of these is called by the Greeks *πετεΐα*, *petteia*, and by the Italians *pettia*.

*Petteia* or *pettia*, then, is the art of making a just discernment of all the manners of ranging or combining sounds among themselves, so as they may produce their effect, *i. e.* may express the several passions intended to be raised, thus: *e. gr.* it shews what sounds are to be used, and what not; how often any of them are to be repeated; with which to begin, and with which to end; whether with a grave sound to rise, or an acute one to fall, &c.

It is the *petteia* that constitutes the manners of the music; it being this that chooses out this or that passion, this or that motion of the soul, to be awakened; and whether it be proper to excite it on this or that occasion. The *petteia*, therefore, is in music much what the manners are in poetry.

We do not see whence the denomination should have been taken by the Greeks, unless from *πετεΐα*, their game of chess; the musical *petteia* being a sort of combination and arrangement of sounds, as chess is of pieces called *πετεΐοι*, *calculi*, or chess-men.

**PETTENAW**, in *Geography*, a town of Tyrol, near the Inn; 12 miles W.S.W. of Inspruck.

**PETTENDORF**, a town of Germany, in the principality of Culmbach; six miles S.W. of Bayreuth.

**PETTERKAW**, a town of Prussia, in Oberland; 24 miles E.S.E. of Marienwerder.

**PETTERSODORF**, a town of Prussia, in the province of Natangen; 28 miles E. of Königsberg.

**PETTERSWALDT**, a town of Prussia, in the province of Natangen; 24 miles S.S.W. of Brandenburg.—Also, a town of Prussia, in the province of Ermeland; 10 miles W. of Heilsberg.

**PETTERWITZ**, a town of Prussia; in the province of Oberland, four miles S.S.E. of Neidenberg.

**PETTICOTTA**, a town of Hindoostan, in the Carnatic; 27 miles S. of Tanjore.

**PETTINCO**, a river of Sicily, in the valley of Mazara, which runs into the sea; six miles N.W. of Mistrella.

**PETTINI**, a small island in the gulf of Venice. N. lat.  $44^{\circ} 37'$ . E. long.  $44^{\circ} 49'$ .

**PETTORANO**, a town of Naples, in Abruzzo Citra; five miles S. of Salmona.

**PETTSTATT**, a town of Bavaria, in the bishopric of Bamberg; three miles S. Bamberg.

**PETTUS**, *Sir JOHN*, in *Biography*, a native of Suffolk, was member of parliament for Dunwich in the reign of Charles II., and one of the deputy governors of the royal mines. He died about the year 1690. He was author of the "History, Laws, and Places of the chief Mines and Mineral Works in England and Wales;" "England's Independence of the Papal Power;" "Fleta Minor, or the Laws of Art and Nature in knowing, judging, assaying, &c. of Metals," translated from the German, which he executed while he was in the Fleet prison.

**PETTY**, *Sir WILLIAM*, was the eldest son of a clothier at Rumsley, in Hampshire, where he was born in 1623. At a very early period he shewed a disposition for the mechanical arts, and was eager in attending to the performances of artificers, such as smiths, carpenters, &c. and copying them. He received the elements of his education at the grammar school of his native place, and from thence, at the age of 15, he was sent to Caen, in Normandy, for farther improvement in modern languages, and the mathematics. On his return he entered into the service of the royal navy, but it does not appear in what particular capacity, and his service in it must have been very short, since, on the commencement of the civil wars in 1643, he went again on the continent, and passed three years in France and the Low Countries. It was at this period that he directed his studies chiefly to anatomy, and the profession of medicine, and at Paris he dissected in company with the celebrated Hobbes. As in his former visit to France he is said to have maintained himself by means of a small stock of merchandize, so in the present he must have followed some gainful traffic, since he has recorded, that he returned ten pounds richer than when he went out. In 1647 he gave the first public proof of his inventive talents, by soliciting and obtaining a patent from parliament for an invention of the art of double writing, which appears to have been by means of a copying instrument. In the following year he published a piece entitled "Advice to Mr. Samuel Hartlib, for the Advancement of particular Parts of Learning," the general scope of which was to extend education to a variety of objects of utility in common life. About this time he went to Oxford, whence the parliamentary visitors had ejected the royalists, and gave instructions in anatomy and chemistry to the younger students. Here he was appointed deputy to the professors of anatomy, and in 1649 he was created doctor of physic by dispensation from the delegates of the university. About the same time he was elected a fellow of Brazen-nose college, and became a member of that

Oxford society for cultivating natural knowledge, out of which the Royal Society took its rise. In 1650 he succeeded to the anatomical professorship in Oxford; and soon after employed his interest so effectually as to be chosen professor of music at Gresham college, which was probably then, as it is now, almost a sinecure place. The chief source of his fortune was his appointment, in 1652, to be physician to the army in Ireland, and in 1654 he entered into a contract for regulating the admeasurement of lands forfeited by the rebellion, and intended by way of recompence to the soldiery. By his peculiar skill in practical, as well as theoretical mathematics, he performed this work with great exactness, and at the same time he obtained such a knowledge of the state and value of property in that country, as enabled him to lay out to great advantage, in purchases of land, the savings of his economy. After this he was appointed one of the commissioners for dividing the lands which he had surveyed among the army; clerk of the council; and secretary to Henry Cromwell, when lord-lieutenant of Ireland. In Richard's parliament of 1658, he served for West-Looc, in Cornwall; and in the next year he was impeached by sir Heilome Sankey, for certain mal-practices in his distribution of the Irish lands. He was, it appears, at the time in Ireland, but returned to answer the charge in his place, but parliament being adjourned, the matter was not brought to issue. He was, after this, removed from his public employments, though the lord-lieutenant continued his friend, and spoke handsomely of him. When the restoration took place he was in Ireland, but upon his return he was graciously received by Charles II., and made one of the commissioners of the court of claims. In 1661 he received the honour of knighthood, and also a patent, constituting him surveyor-general of Ireland; and, what was probably of much more importance to him, all the forfeited lands which had been allotted to him, were confirmed by new grants to himself and his wife. Such is a brief sketch of the political character of sir William Petty. We come now more particularly to his claims on public notice as a man of science. He had been made a fellow of the College of Physicians, and when the Royal Society was first incorporated he was in the list of the council. In 1663 he engaged the public attention by his invention of a double bottomed ship, to sail against wind and tide. His trial-vessel went very well in a voyage from Dublin to Holyhead, and back; but on a second voyage it was lost in a great storm, and no further experiment was made. He presented a model of this ship to the Royal Society, to which body he, in 1665, communicated a paper on ship-building, which was kept by the president, lord Brownlow, as an important state secret. It seems not to be well ascertained whether it was this or another work that was printed after his death, under the title of "A Treatise on Naval Philosophy." The principal and most valuable of the writings of this author, were on the subject of political arithmetic. Of these he published a number of separate tracts, which were reprinted collectively in 1699. Some of them relate to the growth and population of London, and comparisons between that city and Paris, and other capitals. In one of them, entitled "Political Arithmetic," he discusses all the topics connected with national wealth and improvement, with the particular view of pointing out the means of augmenting the power and prosperity of England. The state of Ireland is considered in some of his other pieces, particularly in a treatise on taxes and contributions, which passed through several editions. Some of his papers inserted in the Philosophical Transactions are on mathematical subjects, and some on chemistry, as it was then known. The uncommon activity and vigour of his mind are strikingly

displayed by the great variety of the productions of his pen, while at the same time he was indefatigable in business, and in the improvement of his fortune. With this view he established upon his Irish estates iron-works and fisheries, opened lead mines, and carried on a large timber trade. He was of great service to the poor, by providing them with employment, in which he justly thought the most useful charity towards them consisted. He died in the month of December 1687, at his house in Westminster, and his remains were interred at Rumsley. He was regarded as a person of great worth, as well as of extraordinary talents and acquisitions. He left a widow, the daughter of sir Hardress Waller, who was created baroness of Shelburne in 1688, which title, as we shall see, became hereditary in the family. Sir William Petty thus speaks of his religious opinions in his last will: "I die in the profession of that faith, and in the practice of such worship, as I find established by the laws of my country; not being able to believe what I myself please, nor to worship God better than by doing as I would be done unto, and observing the laws of my country, and expressing my love and honour of Almighty God, by such signs and tokens as are understood to be such by the people with whom I live, God knowing my heart, even without any at all. Grant me, O Lord, an easy passage to thyself, that as I have lived in thy fear, I may be known to die in thy favour."

Three children survived sir William, *viz.* Charles, who succeeded to his mother in the barony of Shelburne, and dying without issue the title became extinct. But in June 1699, it was revived in Henry, the second son; and in 1718-19, king George I. advanced him to the further titles of viscount Dunkeron and earl of Shelburne. He died in 1751, immensely rich. The present family is from Anne, the only daughter of sir William Petty, who married Thomas Fitzmaurice, baron Kerry, created in 1722 earl of Kerry.

Under the articles *ARUNDELIAN Marbles*, and *PARIAN Chronicle*, we have mentioned a gentleman under the name of W. Petty, who was employed by the earl of Arundel, in the year 1624, for the purpose of collecting marbles, books, statues, and other curiosities in Italy, Greece, and Asia Minor. We have been anxious to ascertain some authentic particulars relating to a person of so distinguished a character, as to warrant this employment, and who was so laudably engaged. But though we have been aided in our researches by the ingenious and learned Mr. Hewlett, ever anxious to promote the cause of literature, we have not succeeded in our wishes. The *Bibliotheca Manuscripta Lansdowniana*, deposited in the British Museum, has been examined; and we find in vol. ii. p. 104. the following notices. Art. 806. A Collection of Theological and other Papers of the Rev. Mr. William Petty of Thorley, in the Isle of Wight, with the dates of 1613, 17. Also, The Commentary of George Aepollita, comprising the state of the oriental church and empire for about three-score years, translated out of an original Greek MS. by that late industrious and learned man, William Pettie, dated 6th February, 1644. From A. D. 1183 to 1262, an interval of 79 years. This Mr. William Pettie is supposed to be the same with the Rev. Mr. William Petty of the preceding article; and to have been an uncle of sir William Petty, of whom we have already given an account. He was also, not improbably, the same Mr. Petty who is mentioned in sir Thomas Roe's letters from Constantinople, as having been sent to the Levant by Villiers, duke of Buckingham, to collect Grecian antiquities for Charles I. This Mr. Petty appears to have been shipwrecked, and to have lost all he had collected at Samos in his way to Ephesus. He was lodged in prison as a spy, but released

on the testimony of some Turks, who knew him, and that he had lost his credentials in the sea. With great industry he recovered his statues and 22 Greek MSS., and raked together 200 pieces.

PETTY, WILLIAM, marquis of Landfdown, descended from the two noble families of Fitzgerald, duke of Leinster, and Fitzmaurice, earl of Kerry. The adopted name of Petty is derived from his maternal great uncle, Henry, earl of Shelburne, son of the celebrated sir William Petty, the subject of the preceding article. The marquis of Landfdown was born in May 1737, and succeeded to the Irish honours of his father in the month of May 1761, but in the preceding year his majesty had created the late marquis, then viscount Fitzmaurice, an English peer, by the title of baron Wycombe. In February 1765, he was married to lady Sophia Carteret, daughter of the late earl Granville, by whom he became possessed of large estates, particularly that beautiful spot Landfdown Hill, Bath, from which he took his last title. By this lady, who died in 1771, he had a son, John Henry, who succeeded him in his titles, and who is since dead, leaving no male heir. The marquis married, secondly, lady Louisa Fitzpatrick, by whom, who died in 1789, he had another son, lord Henry, the present marquis of Landfdown. His lordship being intended for the army, he, at a fit age, obtained a commission in the guards, and served with the British troops in Germany under prince Ferdinand, and gave signal proofs of great personal courage at the battles of Campen and Minden. In December 1760, he was appointed aid-de-camp to the king, George III., with the rank of colonel. As a political man, he joined the party of the earl of Bute; and in 1762, he eagerly defended the court on the question respecting the preliminaries of peace. In the following year he was appointed first lord of the board of trade, which he soon quitted, and with it, his connection with the court and ministry, and attached himself, in a short time, to lords Chatham and Camden. When the Rockingham administration was displaced in 1766, and lord Chatham was called upon to form a new administration, he appointed lord Shelburne secretary of state of the southern department; to which was annexed the department of the colonies. But finding a train of measures was secretly pursuing, hostile to the liberties of America, he resigned. The American war succeeded, during which he acted with firmness and energy against the ministry. Among other projects to support this war, was the appointment of a Mr. Fullarton, secretary to lord Stormont, when abroad, to the rank of lieutenant-colonel in the army, and to the command of an intended new regiment. When this matter came before the house of lords, lord Shelburne spoke of it in terms of contempt, denominating the new made commander a *commis*, a clerk taken from the desk. Mr. Fullarton, judging these epithets derogatory to his rank, sent a challenge to lord Shelburne, a duel was fought, and the noble lord wounded. This affair happening very soon after a similar one between Mr. Fox and Mr. Adam, and being attributed to the same causes and motives, occasioned a great sensation throughout the kingdom. Addresses of congratulation from the cities of London and Westminster, and from several of the counties, were sent to earl Shelburne on his recovery, all of which held out the idea, that his life had been endangered by the faithful discharge of his duty as a peer of parliament. The death of lord Chatham placed him at the head of his political connection, and he continued in opposition to the measures of the court till the termination of lord North's ministry, in the spring of 1782. He was then appointed secretary of state in the Rockingham administration, and upon the death of that nobleman he succeeded to the office of minister. This

measure gave great offence to Mr. Fox and his friends, but his lordship did not quit his post. His first object was to make peace; but when the treaty was brought before the parliament, lord North and Mr. Fox had united in a most disgraceful coalition, and the treaty meeting with the disapprobation of the representatives of the people, lord Shelburne resigned, and Mr. Pitt was appointed his successor. His lordship now received the title of marquis of Landfdown, with the honours of the Garter.

When the French revolution took place he earnestly deprecated our interference, but his eloquence and sound reasoning had no weight, and we were in 1793 involved in a war, which, with a very short interval, has continued to this present time (Dec. 1813). His lordship died on the 7th of May 1805.

Through life he resisted the increasing influence of the crown, and he suggested at various times enquiries into the public expenditure: he proposed the abolition of useless places, and brought forward plans which tended to establish a rigid system of public economy. With foreign politics, and foreign courts, no statesman in Europe was better acquainted. He had deeply studied the history and laws of his country, and they had taught him that the constitution of England is not the grant of princes, but an inheritance obtained by the virtue and wisdom of Englishmen. Monthly Mag. 1805.

PETTY Bag, an office in chancery; the three clerks of which record the return of all inquisitions out of every shire, and make all patents of customers, gaugers, comptrollers, &c. See CLERK.

PETTY-Chaps, in Ornithology. See MOTACILLA *Hippolais* and *Hortensis*.

PETTY Constables. See CONSTABLE.

PETTY-Fogger, formed from the French, *petit*, little, and the Saxon, *fogere*, *sutor*, or *woorer*, a little sticking solicitor or jobber in law-disputes, without either skill or conscience.

PETTY Harbour, in Geography, a bay on the east coast of Newfoundland. N. lat. 47° 30'. W. long 52° 20'.

PETTY, or PETIT Larceny, in Law. See LARCENY.

PETTY Orders. See ORDERS.

PETTY Patees, among Confectioners, a sort of small pies, made of a rich crust, and filled with sweet meats.

PETTY-Singles, among Falconers, are the toes of a hawk.

PETTY Tally, in the Sea Language, a competent allowance of victuals, according to the number of the ship's company.

PETTY, or *Petit Treason*, in Law. See TREASON.

PETTY Whin. See FURZE and GENISTA.

PETTYCUR, in Geography, a harbour and landing-place from Leith, on the coast of Fife, in Scotland, west of Kinghorn.

PETULANTIUM FESTUM, in Antiquity, a festival celebrated by the Athenians and Lacedæmonians in honour of the moon, under the name of Venus: at which the men assisted, dressed in women's clothes; and the women in the habits of men.

PE-TUNG, in Metallurgy, a name given by the Chinese to their white copper, which has a beautiful silver-like appearance, and a very close grain. It takes a fine polish; and many articles of neat workmanship, in imitation of silver, are made from it. An accurate analysis has determined it to consist of copper, zinc, a little silver, and in some specimens, a few particles of iron and of nickel have been found. The artists at Canton, in making their pe-tung, reduce the copper into as thin sheets or laminæ as possible, which they make red-hot, increasing the fire to such a pitch, as to

loften, in some degree, the laminæ, and to make them almost ready to flow. In this state they are suspended over the vapour of their purest tutenag, or zinc, placed in a subliming vessel over a brisk fire. The vapour thus penetrates the heated laminæ of the copper, so as to remain fixed with it, and not to be easily dissipated or calcined by the succeeding fusion it has to undergo. The whole is suffered to cool gradually, and is then found to be of a brighter colour, and of a closer grain than when prepared in the European way. Lord Macartney's Embassy, &c. by Sir G. Staunton, vol. ii.

PETUNTSE, or, as it is usually called, *petunse*, one of the two substances of which the porcelain ware of China is made. The other is named *kaolin*.

The petuntse is sprinkled all over with bright glittering particles; it is beaten to powder, and afterwards made up into a fort of bricks, and in that form it is sent to the places where it is to be wrought; it is of a hard texture, and of a somewhat greenish colour. M. Reaumur, of the Academy of Sciences of Paris, who was extremely industrious in searching into the nature of porcelain, obtained some specimens of the petuntse, both in its native state, and in form of the brick, which is given it after it is powdered and reduced to a paste.

M. Reaumur found that the petuntse was so far from being an earth, as usually supposed, that it was truly of the nature of the European flint or pebble, as he establishes the character of that body: but to understand this rightly, it is to be observed, that this author makes the flints and pebbles a very large class of bodies, some of which are more, some less transparent; and that this petuntse is of the nature of the coarser, or less transparent kind, the surface of which, when broken, is not so smooth and polished as that of the ordinary flint. Some have supposed that this substance is a species of gypsum, rather than of flint or tale. By some experiments of Mr. Scheffer, in the Swedish Transactions, for the year 1753, it appears to be a glittering, flaky, semi-transparent mass, like the *lapis specularis*, of a light greenish-grey colour, and remarkably heavy. It was not acted upon by acids, and in the fire it burst and fell in pieces, and calcined into a white powder, interspersed with a red ferruginous matter. Calcined in contact with the fuel, it emitted strong sulphureous vapours, like the other gypsum, and became quite white, considerably firm and coherent, and semi-transparent.

The great character of these stones for the porcelain manufactures is, however, that they are very easily vitrified without the assistance of any salt, and without the immediate contact of the fire, the operation succeeding in a crucible, which is not at all the case in regard to the European flints, they very difficultly melting alone in a crucible, and then only into a whitish opaque glass.

It being certain from hence, that one of the two ingredients of the china-ware is easily vitrifiable, it follows, from the experiment of the whole mixture, or china-ware, not being reducible into a glass in a large fire, that it is a composition of a vitrifiable and a not vitrifiable (or at least not easily vitrifiable) substance; and, consequently, that the kaolin is a scarcely vitrifiable body, and that the result of the action of fire on a mixture of these two is a semivitrification; which is what we call the china-ware.

If we, therefore, could, in Europe, provide the materials of China, or such as were like them, we might reasonably hope to succeed; and this appears far from improbable. The petuntse is easily supplied by many of our own earths, stones, and sands, as nothing is required in it more than a property of running easily into a white glass. The kaolin

seems most to be resembled by our European tales. Mem. Acad. Par. 1727.

The petuntse, according to Chaptal, is that species of felsex, known by the names of feldspar, rhomboidal quartz, and spathum scintillans. It very frequently forms one of the principles of granite, and the crystals which are found separate, arise from the decomposition of this primitive rock. The texture of feldspar is close, lamellated, and it is less hard than quartz. It fuses without addition into a whitish glass. The specific gravity of white feldspar is 25.946: 100 parts of white feldspar contain, according to Chaptal, about 67 felsex, 14 alumine, 11 barytes, and 8 magnesia. See FELSPAR, KAOLIN, and PORCELAIN.

PETWORTH, in *Geography*, a market-town, in the hundred of Rotherbridge, rape of Arundel, and county of Sussex, is situated on a small branch of the river Arun, 49 miles S.W. by S. from London. Its site is considered very salubrious, and the houses are well built, though the streets are irregular. The living is one of the richest in the county, and in the gift of the earl of Egremont. The church, in which are interred the remains of many of the Percies, earls of Northumberland, is built of stone, and has a square tower; but there are no monuments worthy of notice, except two very ancient tombs, the one completely defaced, the other in a very dilapidated state. In the centre of the town is a handsome market-house of stone, adorned at one end with a bust of William III. The lower part consists of piazzas, with an open space for the market, over which is the room where the quarter-sessions are held. Close to the church-yard is a charity-school, for the education of twenty boys, and the same number of girls, founded by the Rev. Mr. Taylor, who also left donations of twelve pounds a-year each to two clergymen's widows of the neighbourhood, and six pounds each to two poor tradesmen, to assist them in business. The alms-houses, founded by the duchess of Somerset, are built of brick, and adapted for the accommodation of twenty widows, each of whom has an allowance of twenty pounds a-year. Thompson's hospital, another benevolent institution of the same kind, affords lodging for six poor men, and as many women, who annually receive ten pounds each. At a small distance south-east of the town is the bridewell for the county, a brick edifice, on Howard's plan.

Petworth was the residence of Josceline of Louvaine, the progenitor of the renowned Percies of Northumberland; and it was their family-seat till the extinction of the title, when it devolved by marriage to Charles, duke of Somerset; from whom, also by marriage, the manor and mansion-house have been transmitted to the family of Egremont, the present possessors.

Petworth-house, the magnificent family-mansion of the earl of Egremont, is close to the town, the back front opening into the church-yard. It was erected on the site of the ancient house belonging to the duke of Somerset. The front of freestone, adorned with statues on the top, forms one unbroken range, having twenty-one windows in each story. The interior is elegant, and all the principal apartments are decorated with paintings, antique statues, and busts, some of which are of the first excellence. Some of the rooms are noble, well contrived, and richly furnished, and the dispositions of the specimens of art tasteful and judicious. The park is very extensive, the wall being about twelve miles in circumference. In front of the mansion is a sheet of water, which has been formed at a vast expence. It is supplied by the springs collected from the neighbouring hills. This park, which commands delightful views of the Downs of Surrey and Sussex, is well stocked with deer and game.

game. There are also various breeds of cattle and sheep fattened in the park: besides the native breeds of the latter, the present earl has imported the Calmuck and Afracan race, and likewise the shawl goat of Thibet, from the fleece of which some of the most valuable manufactures of the East Indies are produced.

The petty sessions are holden at Petworth. The market is on Wednesday, and there is an annual fair. By the census of 1811, the houses amounted in number to 453, and the inhabitants to 2459. Beauties of England, vol. xiv. Carlisle's Topographical Dictionary, vol. ii.

PETZENKIRCHEN, a town of Austria; 8 miles E. of Ips.

PETZENSTEIN, a town of Germany, in the territory of Nuremberg; 35 miles N.N.E. of Nuremberg.

PEUCEDANUM, in *Botany*, *πευκεδανος* of the ancient Greeks, is evidently, by the account in Dioscorides, and the plants with which he ranges it, something of the umbelliferous order; but what precise species, we find little to assist us in determining; neither has Dr. Sibthorp formed any decided opinion respecting this point. The *Peucedanum officinale*, which this learned traveller gathered on the sea-coast of Laconia, is full as likely as any thing else to be the ancient *πευκεδανος*, or, as some have it, *πευκεδανον*. Concerning the derivation of the name, etymologists are not agreed; but the most probable seems to be from *πικρα*, a *Fir*, or *Pitch-tree*, which its leaves resemble, and *δανος*, *dry*, or *burning*, in allusion to the very pungent qualities of the root and gum, for which this plant is celebrated. Linn. Gen. 134. Schreb. 184. Willd. Sp. Pl. v. 1. 1405. Mart. Mill. Dict. v. 3. Sm. Fl. Brit. 304. Prodr. Fl. Græc. Sibth. v. 1. 188. Ait. Hort. Kew. v. 2. 134. Juss. 223. Tourn. t. 169. Gartn. t. 21.—Class and order, *Pentandria Digynia*. Nat. Ord. *Umbellifera*.

Gen. Ch. *General umbel* of numerous, very long and slender rays; *partial* spreading. *General involucreum* of many, small, linear, reflexed leaves; *partial* smaller. *Pericarion* of five minute teeth. *Cor. Universal* uniform; flowers of the disk abortive; *partial* of five equal, oblong, incurved, entire petals. *Stam.* Filaments five, capillary; anthers simple. *Pist.* Germen inferior, oblong; styles two, small; stigmas obtuse. *Peric.* Fruit ovate, furrowed with a wing, striated at each side, separable into two parts. *Seeds* two, ovate-oblong, compressed, most convex outwardly, marked with three elevated lines; furrowed by a broad, membranous, undivided border; emarginate at the summit.

Ess. Ch. Fruit ovate, striated at each side, encompassed with a wing. Calyx of five teeth. Involucreum very short. Flowers of the disk abortive.

1. *P. officinale*. Sea Sulphur-wort, or Hog's Fennel. Linn. Sp. Pl. 353. Engl. Bot. t. 1767. (*Peucedanum majus*; Ger. Em. 1054.)—Leaves five times deeply three-cleft; segments linear, undivided.—Native of salt marshes and ditches on the sea-coast of the south of Europe; very rare in England, and chiefly found below Feverham and Whitstable in Kent, flowering from July to September. The whole plant is smooth, and when bruised emits a strong sulphureous smell, especially the root, which is perennial, tap-shaped, very resinous and fætid, reported to be useful in coughs, obstructions of the viscera, and nervous disorders. These virtues seem to have been handed down from Dioscorides. *Stem* nearly a yard high, erect, round, striated, branched, leafy, tough. *Leaves* narrow and rigid, forming a copious coma, or tuft, at the root, as Dioscorides says of his *πευκεδανος*; each is divided five or six times successively, into three deep divisions, the ultimate segments

flattish, linear, acute, entire. *Umbels* large, rather concave, pale yellow, of innumerable flowers. *Fruit* tawny, broadly elliptical, flat.

2. *P. alpestre*. Alpine Sulphur-wort. Linn. Sp. Pl. 353. (*Peucedanum*; Riv. Pentap. Irr. t. 11. Ger. Em. 1054?)—Leaves twice or thrice deeply three-cleft; segments linear, pinnatifid.—Native of Germany. The authentic Linnæan specimen is marked *P. germanicum*, and seems to have been obtained from some Dutch herbarium or garden. On revising the synonyms of the first species, we have no scruple in removing some of them to this; especially that of Rivinus, whose plate accords with this species, and not with the former, in the divisions of its leaves, as well as in the size and whole aspect of the plant. This synonym therefore ought to be struck out of Prodr. Fl. Græc., and a reference to Engl. Bot. t. 1767, substituted in its stead. A correction of Linn. Sp. Pl. as well as of Willdenow and Aiton, is also necessary; *P. germanicum* being no other than *P. alpestre*; and the large supposed variety called *italicum*, is the very identical *officinale* itself, above described, answering to the Linnæan character and authentic specimen. *P. alpestre* is a much smaller plant than *officinale*, and essentially characterized by the ultimate divisions of its leaves being pinnatifid, and somewhat decurrent, while the general divisions are fewer. The *umbel* is very much smaller, of fewer but stouter rays. *Seed* with a broader and pale border.

We have some scruple respecting Gerarde's synonym. His first figure may probably be only a smaller representation of the *officinale*, with which the structure of its leaves agrees.

3. *P. capillaceum*. Capillary Cape Sulphur-wort. Thunb. Prodr. 50. Willd. n. 3.—“Leaves doubly pinnatifid; segments capillary, furrowed.”—Native of the Cape of Good Hope. *Thunberg*.

4. *P. tenuifolium*. Slender-leaved Cape Sulphur-wort. Thunb. Prodr. 50. Willd. n. 4.—“Leaves doubly pinnatifid; segments lanceolate, bordered, opposite or alternate.”—From the same country.

5. *P. sibiricum*. Siberian Sulphur-wort. Willd. n. 5.—“Leaves more than twice compound; leaflets linear, acute. First umbels sessile.”—Native of Siberia.—*Leaves* supradecomposite; their leaflets long, linear, acute, running down into the partial footstalk; the lower stem-leaves furnished at the base with an ample sheath. First *umbel* sessile in the fork of the stem; the rest stalked. *General involucreum* wanting; partial ones setaceous and very short. *Petals* inflexed. *Styles* permanent, divaricated. Ripe seeds not seen by Willdenow, who referred this plant to *Peucedanum* by its habit. We have a specimen of a plant from Pallas, who found it in dry situations about the Wolga frequent, which may possibly be the same with what Willdenow described. In ours indeed there is no sessile *umbel*, but the inflorescence is so irregular, some *umbels* being proliferous just below their base, that, as the other characters agree with tolerable exactness, we feel little uncertainty on the subject. Pallas says Cusson meant to call his plant *P. anagynnodes*. Its radical leaves are described as four times ternate. There is a minute roughness on the foliage of the specimen.

6. *P. japonicum*. Japanese Sulphur-wort. Thunb. Jap. 117. Willd. n. 6. (San bofu; Kämpf. Amoen. Exot. 825.)—“Leaves five times deeply three-cleft; segments three-cleft, wedge-shaped.”—Native of the sea-coasts of Japan, flowering in September and October. Whole plant smooth. *Stem* scarcely a foot high, as thick as a goose-quill, erect, branched, zigzag. *Leaves* with a broad, striated, sheathing base to the footstalk. *Seeds* ovate, furrowed, with a slight border. *Thunb.*

7. *P. Silaus*. Meadow Sulphur-wort. Linn. Sp. Pl. 354. Engl. Bot. t. 2142. Mart. Rust. t. 128. Jacq. Austr. t. 15.—Leaflets pinnatifid; their segments opposite, decurrent. General involucrem of barely two leaves.—Not unfrequent in rather moist pastures, throughout Europe, flowering in August and September. A dark-green, rigid, nearly smooth plant, varying very much in the breadth and decomposition of its leaves, fetid when bruised, and supposed to give a bad flavour to butter in some parts of Norfolk; but there is a doubt whether cattle will eat it. The stem is from one to two feet high, very straight. Flowers greenish-white. Fruit but obscurely bordered.

8. *P. alsaticum*. Alsatian Sulphur-wort. Linn. Sp. Pl. 354. Jacq. Austr. t. 70. (*Daucus alsaticus*; Bauh. Prodr. 77.)—Leaflets pinnatifid; their segments three-cleft, bluntish, palmate.—Native of various parts of Austria, Alsatia, and the Palatinate, in moist ground. The leaflets are much shorter and broader than the last, with more apparent roughness at the edges. Umbels very copious, smaller, yellowish.

9. *P. aureum*. Golden Sulphur-wort. Ait. n. 5. Willd. n. 9.—Leaves triply pinnate; those on the stem with linear-lanceolate, those from the root with oblong, many-cleft, leaflets.—Native of the Canaries, from whence Mr. Mallon brought it to Kew in 1779. It is a green-house biennial plant, flowering in June. We have seen no specimen.

10. *P. obtusifolium*. Blunt-leaved Sulphur-wort. Sm. Prodr. Fl. Græc. n. 659. Fl. Græc. t. 277, unpublished.—Leaflets pinnatifid, coriaceous; their segments opposite, obovate, obtuse.—Gathered by Dr. Sibthorp in Bœotia, and on the shores of the Euxine. Root perennial, with a fibrous crown. Stems a foot high, bowed, round, leafy. Leaves smooth, a foot long, first three-cleft, then pinnatifid, of a thick leathery texture. Footstalks with a hollow sheathing base. Umbels yellowish-white, of stout, not numerous, rays. General and partial involucrem of several short, broad, acute leaves. Corolla a little irregular. Seeds with a thickish border. This plant has much of the aspect of an *Heracleum*.

11. *P. microphyllum*. Small-leaved Sulphur-wort.—Leaves thrice pinnate; leaflets three-cleft, fleshy. General involucrem scarcely any.—Gathered plentifully in the salt deserts about the Wolga, by Pallas, who sent it to Linnæus as a new *Peucedanum*, but we do not find that it has been any where published. It is smaller than the last, with differently compounded leaves, and much smaller leaflets. Stem glaucous. General involucrem sometimes of a single setaceous leaf, but oftener wanting, as the partial ones also seem mostly to be. We have seen no seeds, so that the genus must remain doubtful.

12. *P. nodosum*. Knotty Sulphur-wort. Linn. Sp. Pl. 354. Willd. n. 10.—“Leaflets alternately many-cleft.”—Found in Crete, by Tournefort, who describes the stem as knotty, and the leaves like fennel. We know nothing more of this species.

13. *P. geniculatum*. Bent Sulphur-wort. Forst. Prodr. 22. Willd. n. 11.—“Leaves roundish kidney-shaped, crenate.”—Native of New Zealand. This is also unknown to us. Analogy would lead us to presume that the word leaflets, not leaves, should be used in the specific character.

PEVENSEY, in Geography, a member of the town and port of Hallings, in the rape of Pevensey, and county of Sussex, is situated on the English channel, 60 miles S.E. by S. from London. Though of little note now, Pevensey was formerly of importance as a commercial port, but the gradual receding of the sea, from which it now stands at

some distance, has occasioned its decline. Boats with difficulty ascend to the village by a small rivulet. It is a place of great antiquity, and according to Richard of Cirencester, was the Anderida Portus of the Romans. It is reckoned among the sea-ports ravaged by Godwin, earl of Kent, in the time of Edward the Confessor. It is also celebrated in history, as the place where William the Conqueror landed with his invading army. From Madox's History of the Exchequer, it appears that in the sixth year of the reign of king John, Pevensey, among other trading towns, paid a quinqueme, or tax, for its merchandize, and that three years afterwards the barons of Pevensey fined forty marks for licence to build a town upon a spot between Pevensey and Langley; which should enjoy the same privileges as the cinque-ports, and have a yearly fair to last seventeen days, commencing on the anniversary of St. John Baptist; also a market every Saturday. Whether any part of this grant was ever carried into effect, we are not informed. The only relic of the ancient consequence of Pevensey is the castle, which stands on the east side of the town. The name of the builder, and the date of its erection, are alike unknown; but from the quantity of Roman bricks employed in the works, there is much reason to believe that it was constructed out of some Roman fortrefs. The external walls, of which the towers are tolerably entire to the height of 20 or 25 feet, are circular, and inclose an area of seven acres. The principal entrance is from the west or land side, between two round towers, in which are considerable layers of Roman brick, some single, others double, about twenty feet from the ground, and four or five asunder. Many such layers of white brick or stone hewn into that form, lie between the strata of red, or in place of them, in the walls between the other towers to the north-west, and in the north-east tower are some stones laid herring-bone fashion towards the bottom. Within is a smaller fortification, of a quadrangular form, moated on the north and west. It has round towers and a drawbridge, which corresponds with the outer gate, and, like the latter, is not in the centre of the wall side, but rather more to the south. The east wall of both is the same, and stands on a kind of cliff, that appears to have been once washed by the sea, which, however, must have receded before the town was built. There are no Roman bricks in the inner work, and only in the north and west sides of the outer. Several of the turrets in the latter are of solid masonry, and seem to have been designed, not for defence, but to deceive an enemy. In the area of the outer castle, are two culverins without carriages; one of them measures eleven feet in length, is hooped, has a rose and crown, and the letters E.R. marked on it, probably for Elizabetha Regina; the other is twelve feet long, and is marked W.P. They lie within two yards of one another, sunk into the earth and pointing to the sea. Sir William Burrell relates, that in 1710, a workman, engaged in conveying water from the moat of the castle into the town, was obliged for that purpose to make his way under the wall, the thickness of which he computed to be about ten feet. The foundation he discovered to consist of piles, planked over with slabs of an extraordinary substance, but notwithstanding the length of time since the erection of the castle, there appeared to be no decay in the slabs. The colour only seemed to be changed, and the leaves of faggots found there were still found. William the Conqueror gave the town and castle to his half brother Robert, earl of Mortaigne, in Normandy, and created him earl of Cornwall. These honours he enjoyed during the life of that king, but having taken part under his successor in an insurrection excited by his brother Odo, earl of Kent, in favour of Robert

bert Courthofe, an army was fent againft this caftle, on which he thought proper to furrender, and make his peace. He was fucceeded in his poffeffions by William, earl of Mortaigne and Cornwall, who, on being refufed the earldom of Kent by Henry I., joined in a rebellion with Robert de Belefme, earl of Shrewsbury. The king in confequence feized all his eftates, demolished moft of his caftles, and exiled him from the realm. He gave to Gilbert de Aquila the town and caftle of Pevenfey, which thence was called the "Honour of the Eagle," with all their dependencies, in whole defcendants it remained vefted for fome time, but being again forfeited to the throne, Henry III. granted it to his fon prince Edward, and his heirs, kings of England, that it fhould never more be feparated from the crown. It, however, came into the family of Lancafter, and from them to that of Pelham, till about the middle of the laft century, when it came to earl Wilmington, on being created baron of Pevenfey, from whom, by an intermarriage, it has devolved to lord Cavendifh. The eccentric and celebrated Andrew Borde was a native of this place. (See BORDE, ANDREW.) The church is dedicated to St. Nicholas. By the cenfus of 1811, the number of houfes was 149, and the inhabitants amounted to 838. The Hafting's Guide, 2d edit. 1797.

PEVEREL POINT, a cape or point of land on the coaft of Dorfetfhire, in the Englifh channel, S. of Pool harbour, having at its end a ledge of rocks, which extends far into the fea. On this point is a battery; 12 miles W.S.W. from the Needles. N. lat. 50° 34'. W. long. 3° 3'.

PEVET. See PIVOT.

PEVETS, in a *Watch*, the ends of the fpindle of a wheel in a watch. The holes into which they run are called *pevet-holes*.

PEUMUS, in *Botany*, *Peumo* of the inhabitants of Chili, a tree belonging to the *Hexandria Monogynia*, for which Molina has retained this name. Juffieu fuppofes it to be allied to his *Rubentia*, the *Elaodendrum* of Jacquin, Murray, Schreber, &c.

PEUTINGER, CONRAD, in *Biography*, a learned German, was born at Augfburg in 1465. He purfued his ftudies in the principal univerfities of Italy, and returned a graduate in civil and canon law. In the year 1493 the fenate of Augfburg appointed him to the fecretaryfhip of the city, and he was its deputy at the diets held during the reign of the emperor Maximilian. After the death of the emperor in 1519, he was fent to Bourges to compliment Charles V. on his acceffion to the empire. He employed all his credit with thefe fovereigns for the benefit of his native city, and procured for it the privilege of coining money. He was through almoft the whole of a long life an active and ufeful member of the ftate to which he belonged, and died in the year 1547, at the age of 82, having paffed his latter years in a ftate of fecond childhood. He left a large and well chofen library, which remained many years in the family, but which finally came to the Jefuits of Augfburg. The name of this author is belt known from the ancient Peutingian table, of which the following is the hiftory. It is a rude chart drawn by an unknown hand during the reign of Theodofius the Great, and marking the Roman military roads through the greateft part of the western empire; it was found in a German monaftery by Conrad Celtes, who prefented it to Peutinger. He intended to publifh it, but did not execute his defign, and after his death it difappeared for feveral years. At length fragments of it were found and publifhed at Venice in 1591, under the title of "Fragmenta Tabulæ antiquæ ex Peutingarum biblio-

theca." In the eighteenth century, it was difcovered entire among Peutinger's MSS., and a fine edition of it was given at Vienna in 1753 by Scheib, illuftrated with notes and difertations. Peutinger was the author of "Romanæ vetuftatis Fragmenta in Augufta Vindelicorum," &c. 1508, which was reprinted under the title of "Inferiptiones vetuftæ Romæ et eorum Fragmenta in Augufta Vindelicorum;" "Sermones Conviviales," which have been frequently reprinted, and many other works. Moreri.

PEWET ISLAND, in *Geography*, a fmall ifland in the German fea, near the coaft of Elbæ; five miles S.S.W. from the entrance into Harwich harbour.—Alfo, a fmall ifland in Poole harbour.

PEWIT, in *Ornithology*, the Englifh name of a common bird of the *larus*, or fea-gull kind, called by fome authors *larus cinereus*, and by others *cepphus*, and in fome of the counties of England the *black-cap*, and *fea-crow*: this is the *LARUS ridibundus* (not *rudibundus* as mifprinted) of Linnaeus.

It has its Englifh name from its note, which feems to exprefs the word *pewit*, and is a kind of hoarfè laugh. It is affirmed by many, that the head of this bird is only black at a certain feafon of the year.

Pewits are birds of paffage, reforting to pools and fens in fome of the inland counties, particularly Staffordfhire, in the fpring, and after the breeding feafon difperſing to the fea-coafts. The young were formerly much efteemed and fattened for the table. Plot relates, that at the death of the lord of the foil, they fhift their quarters for a certain time. There was a piece of ground near Portfmouth, which formerly produced 40l. a-year to the owner, by the fale of pewits. Ray and Pennant.

PEWIT is alfo a name given to the baftard plover, or *lap-wing*; which fee. See alfo *TRINGA Vanellus*.

PEWSUM, in *Geography*, a town of Eaft Forefland, the principal place of a bailiwick; fix miles N.N.W. of Emden.

PEWTER, a factitious metal ufed in domeftic utenfils. It is very uncertain in its compofition. The common utenfils of the loweft price are made from an alloy compofed of about 20 of tin, 3 of lead, and 1 of brafs. The lead is of no ufe, but to make it cheaper, and doubtlefs on this account is often ufed in larger proportion. The brafs is intended to give ftiffnefs and hardnefs, the tin being of itfelf much too foft.

Another alloy of this kind is made without lead, confifting of tin combined with antimony, and copper in fmall proportion, to give it hardnefs. This is manufactured into almoft all the articles which are ufually made of plated copper, and is known by the name of Britannia metal.

The practice of putting lead into thefe alloys is extremely dangerous. Malt liquor, and particularly porter, always contains more or lefs acetic acid, which cannot fail to difſolve ſome of that deleterious metal.

The baſis of this metal is, as we have already faid, tin, and it confiſts of three different ftandards: *viz.* that which is called plate-metal, of which plates and diſhes are made, which is formed of tin and regulus of antimony, in the proportion of one hundred and twelve pounds of the former to fix or feven pounds of the latter. Wallerius gives for this fineſt kind of pewter, the proportions of 12 parts of tin, 1 of antimony, and about  $\frac{1}{5}$  of copper. A very fine metal is made of 100 parts of tin, 8 of antimony, 1 of biſmuth, and 4 of copper. The ufe of theſe additions to the tin is to harden it, and preſerve its whitenefs, and this fine kind of pewter takes a very high poliſh, has a beautiful filvery luſtre, and is not readily tarniſhed. Tin, with a little zinc or brafs,

brass, makes a very fine hard alloy. The antimony is so intimately united to the tin, that it is not volatilized when strongly heated, or only in a very small degree, and it is not easily dissolved by any weak acid, so that in the use of this kind of pewter there is no danger of incurring the common effects of this metal.

The next metal inferior to this is called trifling metal, and is lowered one half-penny *per* pound in worth, by alloying it with lead; of this metal ale-houfe pots are made; the lower sort of metal is still farther alloyed by lead, so as to reduce the value two-pence in a pound lower than plate-metal; of this, which is called lay-metal, wine-pots are made.

Lead may be mixed with tin in any proportion, without destroying the malleability of the compound metal, whereas the brittle metals, and copper, impart a brittleness to the alloy, when they exceed certain proportions. Hence lead and tin, with or without other smaller additions, form the pewter in ordinary use. Lead being the cheapest of the two metals, the manufacturer finds it his interest to employ it in as large a proportion as possible; but danger having been apprehended from this noxious metal, the French government appointed a commission of some very able chemists to examine the subject; and they found, that when wine or vinegar is allowed to stand in vessels composed of an alloy of tin and lead in different proportions, the tin is first dissolved; whilst the lead is not sensibly oxydated by these liquors, except at the line of contact of the air and the liquor; and no sensible quantity of lead is dissolved even by vinegar, after standing for some days in vessels that contained no more than about 18 *per cent.* of lead. Hence it was concluded, that as no noxious effect is produced by the very minute quantity of tin which is dissolved, a pewter may be considered as perfectly safe, which contains about 80 or 82 *per cent.* of tin; and where the vessels are employed merely for measures, a much less proportion of tin may be allowed. But the common pewter of Paris was found to contain no more than about 25 or 30 *per cent.* of tin, and the remainder was lead. For the results of the processes of Messrs. Bayen and Charlard for ascertaining the nature and proportions of the several alloys used by the pewterers of Paris, we refer to Chaptal's "Elements of Chemistry," vol. ii. See TIN.

Pewter has occasionally served for money. In the Philosophical Transactions, M. Putland informs us that king James II. turned all the pewter vessels, &c. of the Protestants in Ireland he could seize, into money; half-crowns were somewhat bigger than halfpence, and other pieces in proportion.

He ordered it to be current in all payments: whence, our author observes, people absconded for fear of being paid their debts: he also mentions crown pieces of this metal, with this legend on the rim, *melioris tessera fatis*.

PEYAUNNY, in *Geography*, a town of Hindoostan, in Oude; 18 miles S. of Mahomdy.

PEYERBACH, a town of Austria; 7 miles W. of Esserding.

PEYERI GLANDULÆ, in *Anatomy*, the mucous glands of the small intestine, so named from Peyer of Schaffausen, who described them in a work entitled "Exercitatio Anatomico-Medica de glandulis intestinum," 1677. Reprinted in the Bibliotheca of Mangetus.

PEYERSON'S POINT, in *Geography*, a cape on the N. coast of Antigua. N. lat. 17° 18'. W. long. 61 32.

PEYJURÉE, a town of Hindoostan, in the circar of Kitchwara; 14 miles S.S.W. of Ragoogur.

PEYRAC, a town of France, in the department of the

Aude; and chief place of a canton, in the district of Carcassonne. The place contains 1370, and the canton 13,109 inhabitants, on a territory of 307½ kilometres, in 18 communes.

PEYREHORADE, a town of France, in the department of the Landes, and chief place of a canton, in the district of Dax; 10 miles S. of Dax. The place contains 1986, and the canton 9949 inhabitants, on a territory of 172½ kilometres, in 13 communes.

PEYRELAU, a town of France, in the department of the Aveyron, and chief place of a canton, in the district of Milhau; 9 miles N.E. of Milhau. The place contains 261, and the canton 3921 inhabitants, on a territory of 255 kilometres, in 9 communes.

PEYRERE, ISAAC LA, in *Biography*, a French writer, was born at Bourdeaux about the year 1594. He was educated a Protestant, and at one time had an employment under M. de la Thuillierie, ambassador from France to the court of Denmark. After this he obtained a post in the establishment of the prince of Conde. He was a hard student, but thought to be very deficient in enquiry. He published a work in 1655, with the title of "Præadamitæ, sive Exercitatio super versibus 12, 13, 14, cap. xv. Epist. Pauli ad Romanos," in which he attempted to prove that it is the origin of the Jewish nation, and not of the human race, which we find recorded in the book of Moses, and that our globe was inhabited by many nations before Adam, whom he considered as the father of the Jews. The book was, almost as soon as it made its appearance, condemned to be burnt by the common executioner. Though the author had not subscribed his name to it, the fact was well known, and he was arrested at Brussels, and thrown into prison. Through the interposition of the prince of Conde he was set at liberty. Smarting under this prosecution he determined to run no more risks on account of his heresy, and with this view he went to Rome to avow a change in his principles: here, in 1656, he abjured the Protestant religion, and also his treatise on the præadamites, and was, of course, favourably received by pope Alexander VII. His motives were always suspected, as well by Catholics, whom he joined, as by the Protestants whom he left. After his return to Paris he was patronized by the prince of Conde, who made him his librarian, which post he kept till he entered the seminary of our Lady of the Virtues, where he died at the age of 82. He was author of another singular treatise "Concerning the Recall of the Jews," in which he endeavoured to maintain, that after their restoration to the land of Canaan, they would be subject not only to the spiritual authority of Jesus, but to the government of a temporal king, the grand instrument of bringing about that event; and he concluded that king to be the king of France. M. Peyrere was author also of two works entitled "An Account of Greenland;" and "An Account of Iceland." Bayle. Moreri.

PEYROLLES, in *Geography*, a town of France, in the department of the Mouths of the Rhone, and chief place of a canton, in the district of Aix; 9 miles N.E. of Aix. The place contains 1750, and the canton 6164 inhabitants, on a territory of 210 kilometres, in 5 communes. This town is celebrated for its medicinal waters.

PEYRUIS, a town of France, in the department of the Higher Alps; 15 miles S.W. of Digne.

PEYSONNEL, CHARLES, in *Biography*, born at Marseilles in 1700, was son of a physician in that city: he received the elementary parts of his education under the fathers of the Oratory in Marseilles, and was sent to Paris for its completion. He returned to his native place just

before

before the dreadful plague, so well known in history, to which calamity, his father, in fulfilling the duties of his office, fell a victim. The young man was destined for the practice of the law, and having studied at Aix, he was admitted an advocate in the year 1723. He exercised his professional talents with much credit at Marseilles during fifteen years, at the same time that he pursued, with avidity, his literary studies. He, together with his elder brother, was principally instrumental in founding the Academy of Belles Lettres in that city. After this he went out a secretary to the French embassy at the Porte; and then accompanied the marquis de Villeneuve as plenipotentiary to negotiate the peace of Belgrade. He employed himself, while abroad, in composing works on the commerce of the Levant; the embassy in which he engaged; and the remains of antiquity which he observed in his travels. In a tour which he made to Nicomedia and Nicæa, he obtained many medals, which he placed in the rich cabinet of M. Pellerin, and likewise some curious marbles transmitted to the royal cabinet of antiquities, with their explanations. He was, in the year 1747, nominated to the consulship of Smyrna, and, in the next year, the Academy of Inscriptions elected him a foreign associate. He employed persons, at his own expence, to survey the countries of Lesser Asia, south of the Meander, and made some journies thither for the same purpose, in order that he might throw light on those parts of the globe which, at that time, were little known to Europeans. Though less attached to natural history than to antiquities, he communicated some useful and interesting facts to Duhamel for his Treatise on Trees and Shrubs. He died in the year 1757. As a commercial resident he was highly esteemed for his intelligence and disinterestedness, and some papers, published in the Memoirs of the Academy of Inscriptions, especially one "On the Kings of the Bosphorus," exhibit abundant proofs of his learning and diligence of research.

The eldest son of M. Peyssonnel was also a consul at several ports, and he made himself known by several historical and political works: of these one of the most important is entitled "Observations Historiques et Geographiques sur les Peuples Barbares qui ont habité les Bords du Danube, et du Pont Euxin; suivies d'un Voyage fait à Magnesie, à Thyatire, à Sardes, &c. avec Figures." The tour in Asia Minor described in this volume, is illustrated with ancient monuments, inscriptions, and medals. Among his other literary performances are "Observations on Baron de Tott's Memoirs," and a "Treatise on the Commerce of the Black Sea." He died at the advanced age of 80, in the year 1790. Gen. Biog.

PEYSTORF, in *Geography*, a town of Austria; 12 miles W.S.W. of Feldsburg.

PE-YU, a small island near the coast of China, in the Chinese sea. N. lat. 30° 20'. E. long. 120° 20'.

PEZ, a town of Italy, in the department of the Adda and Oglio; 20 miles N. of Breno.

PEZA, a river of Russia, in the government of Archangel, which rises in lake Varzelkoi, and runs into the Mezen; 12 miles S.E. of Ofokolskoi.

PEZENES, a town of France, in the department of the Herault, and chief place of a canton, in the district of Beziers. The town, which is large and commercial, contains 8070, and the canton 11,796 inhabitants, on a territory of 35 kilometres, in four communes. N. lat. 43° 27'. E. long. 3° 31'.

PEZIZA, in *Botany*, somewhat altered from the Greek  $\pi\epsilon\zeta\iota\alpha$ , which is derived from  $\pi\epsilon\zeta\alpha$ , the sole of the foot. Pliny speaks of *Peziza* as the Greek appellation of such *Fungi* as

grow without any stalk, or apparent root. Linnæus has adopted the above word for a genus to which that character is, for the most part, applicable. Linn. Gen. 568. Perf. Syn. 631. Mart. Mill. Dict. v. 3. Hudf. 633. Juss. 4. Lamarck Illustr. t. 886. (Octospora; Hedw. Crypt. v. 2. 4. t. 3—10. Schreb. 770.)—Class and order, *Cryptogamia Fungi*. Nat. Ord. *Fungi*.

Ess. Ch. Receptacle hemispherical, concave, slightly tumid, lined with a smooth coloured hymenium. Cases imbedded, inconspicuous to the naked eye, each containing eight volatile seeds.

The celebrated Perfoon, so deep and scientific in this natural order of plants, has justly restored the original genus of *Peziza*, only removing from it that of *Cyathus*, called by some authors *Nidularia*, which belongs to a totally different tribe of *Fungi*, and of which *Peziza lentifera* of Linnæus, Hudson, &c. is the most common species. *Cyathus* has been omitted in its proper place by our predecessor, and *Nidularia* being not received by writers in general, though surely preferable as a name, we have passed it over. Hedwig determined to retain the appellation of *Peziza* for that genus, and therefore invented the word *Octospora*, alluding to the eight seeds in each cell, for our *Peziza*, in which Schreber has followed him; but we rather follow Perfoon, who takes the lead in this order, and who is not wanting in authorities, among preceding authors, to support him.

This writer defines one hundred and fifty-one species of *Peziza*, disposed in seven sections, of each of which we shall give an example or two. The resemblance between their fructification and the shields of a *Lichen*, is too striking to be overlooked; there is indeed scarcely a difference between them; for the number of the minute seeds is too obscure, and indeed too uncertain, a character, to be referred to. Hedwig says they are invariably eight in the genus before us; but they appear to be often double, and their number is so different in different *Lichenes*, that nothing is to be depended upon concerning it in that tribe. With regard to habit, the distinction is more absolute. A *Lichen* has a vegetating stem, herb, or crust, mostly of perennial duration, extending itself without end; a *Peziza* has but a short existence, perishing as soon as it has perfected the one solitary fructification, which is the end of its creation. Hedwig moreover observes, that a fibrous texture, highly bibulous in its nature, is interwoven with the seed-cases of a *Lichen*; while those of a *Peziza* are separated, if at all, only by unconnected vertical fibres. In a word, the one plant has the fleshy evanescent nature of a *Fungus*, the other the permanent, revivescant, and vegetative constitution of an *Alga*.

Section 1. *Tremella-like; more or less of a gelatinous substance*. Fourteen species.

*P. inquinans*. Perf. n. 1. (*P. nigra*; Bulliard Fr. t. 460. f. 1. *P. polymorpha*; Lightf. 1055. *Tremella turbinata*; Hudf. 563. Elvela; Schæff. Fung. t. 158. *Octospora elastica*; Hedw. Crypt. v. 2. t. 6. f. E.)—Gregarious, viscid, staining black; at length convex and obconical; externally rugged, downy, and of a lighter brown. Not uncommon on the trunks of felled oak trees, especially in autumn and winter, or in a wet summer, always growing, as Perfoon remarks, in longitudinal rows. Its substance is leathery, but internally pulpy; hard when dry; its diameter an inch, more or less. When touched, its disk stains the fingers with a black slimy moisture. In a dry state, the fine velvet-like downiness of the outside is most conspicuous, and assumes a much lighter hue.

*P. sarcoides*. Perf. n. 5. (*P. tremelloidea*; Bull. Fr. t. 410. f. 1. *Helvella sarcoides*; Bolt. Fung. t. 101. f. 2.

*Octospora carnea*; Hedw. Crypt. v. 2. t. 7. f. B.)—Clustered, juicy; deep flesh-coloured externally, with elevated veins; disk purple, lobed at the margin. Frequent on rotten wood in autumn. Its shape is tolerably regular, obconical, with a dilated lobed margin, and a deep hollow *disk* of a purple or vinous hue; the outside, or stalk, pale, with branching elevated veins or plaits. Perfoon confounds with this the *Tremella sarcoides* of Withering, v. 4. 78. Engl. Bot. t. 2450, to which last most of his synonyms refer. The size of the present species is usually less than half that of the foregoing; substance more tender and gelatinous.

Section 2. *Helvella-like*; larger, partaking of a fleshy and membranous substance, brittle, externally rather powdery. Thirty-five species.

*P. aurantia*. Perf. n. 21. (Peziza; Fl. Dan. t. 657. f. 2. *P. coccinea*; Bull. Fr. t. 474. Sowerb. Fung. t. 78. *Helvella coccinea*; Bolt. Fung. t. 100.)—Clustered, sessile, obliquely wavy; whitish externally; disk orange-scarlet.—Common in autumn about the roots of decayed oaks, sometimes on gravel walks in gardens, after much wet, growing in clusters of various sizes. The plants are from half an inch to two or three inches in diameter, variously cup-shaped, without any stem, often wavy, and oblique, or convoluted; the *disk* of an orange hue inclining to scarlet, but palest in wet weather; the outside somewhat glaucous, with a kind of bloom. Withering confounds this with *P. coccinea*, hereafter mentioned in the next section, and we believe Hudson fell into the same error.

*P. vesiculosa*. Perf. n. 31. Sowerb. Fung. t. 4.—Clustered, hemispherical, rather contracted at the margin; disk brown, separating from the slightly downy, whitish, outer coat.—Very common on exposed dunghills, according to Mr. Sowerby, who detected the essential character, consisting in a separation, and hollow space, between the *hymenium* and the *receptacle* or outer coat. In a young state the fungus is globular, white or cream-coloured, and rather downy; as it expands, the mouth still remains for some time much more contracted than the rest. The full-grown plant is two inches wide; the *disk* of an amber brown. The above intelligent author seems to have erred in citing Bulliard's t. 457. f. 1, unless that figure be very faulty and defective. Perfoon omits it.

*P. Sowerbiana*. Perf. n. 34. (*P. radiculata*; Sowerb. Fung. t. 114.)—Clustered; externally white, downy, with a long tapering root; disk concave, yellow.—Found by Mr. Sowerby in Wanstead garden, Essex, in the autumn of 1794 and 1795. No other botanist seems to have observed this species. It grows in clusters, apparently sessile, the long tapering root being concealed amongst earth and dead leaves. The *cup* is above an inch wide, of a bright ochraceous yellow in the *disk*; externally white, downy, reticulated with prominent veins.

*P. Acetabulum*. Perf. n. 39. Linn. Sp. Pl. 1650. With. v. 4. 346. Sowerb. Fung. t. 59. Bull. Fr. t. 485. f. 4.—Solitary, hemispherical, brown on both sides; with elevated, branching, pale, external veins, and a pale fluted stalk. A rare species, and one of the largest; found in sandy hedge bottoms, or on very rotten wood in the shade, in winter. Its furrowed *stalk*, like that of an *Helvella*, sending up branching elevated veins over the lower half of the large thin cup, and the brittle, smooth, waxy nature of the whole fungus, well mark this species, which preserves its appearance and characters sufficiently well in drying.

Section 3. *Mostly small. The outside of the cup either bristly, hairy, downy, or woolly.* Thirty-five species.

*P. hemispharica*. Perf. n. 51. (*P. hispida*; Hudf.

635. With. v. 4. 354. Sowerb. Fung. t. 147. *P. Labellum*; Bull. Fr. t. 204. Elvela; Schæff. t. 151.)—Clustered, sessile, hemispherical, clothed with clustered brown hairs; disk glaucous-white.—Found in autumn, after rains, growing amongst moss on the ground, but not common. This is among the larger species of the present section, being sometimes an inch or more in diameter, though occasionally not bigger than a pea. The inflexed margin gives the whole fungus nearly an orbicular shape, though somewhat depressed. The outside is brown, with a tawny call, and clothed with clustered, short, prominent hairs; the *disk* concave, of a singular pearly or glaucous white.

*P. scutellata*. Peri. n. 58. Linn. Sp. Pl. 1651. Hudf. 637. With. v. 4. 353. Sowerb. Fung. t. 24. Bull. Fr. t. 10. (*Octospora hirta*; Hedw. Crypt. v. 2. 12. t. 3. f. B.)—Sessile, nearly flat, orange-red; rough externally with black spreading bristles.—This pretty species is not uncommon on wet rotten wood. It grows generally more or less dispersed, about the size of a large split pea, and is nearly hemispherical at first, fixed by a central, black, fibrous root. The beauty of the pale scarlet disk, which becomes gradually flattened, and the remarkable black bristles, which rise from the outside and overtop the margin, cannot fail to strike the most incurious observer. If by the manner in which Withering cites Bolton and Sowerby, the first is meant to be preferred, nothing can be more erroneous. His supposed varieties moreover include several most distinct plants.

*P. stercorea*. Perf. n. 60. (*P. scutellata*; Bolt. Fung. t. 108. f. 1. *Octospora scutellata*; Hedw. Crypt. v. 2. 10. t. 3. f. B.)—Sessile, concave, orange-coloured; rough externally with short, nearly upright, brown bristles.—Common upon the dung of horses and cows, in low wet pastures. Most authors confound this with the last, from which it differs in its place of growth, smaller size, more concave and paler *disk*, as well as in the shortness, bluntness, and lighter hue, of the external bristles.

*P. coccinea*. Perf. n. 67. Jacq. Austr. v. 2. 40. t. 163. Bolt. Fung. t. 104. (*P. epidendra*; Bull. Fr. t. 467. f. 2. Sowerb. Fung. t. 13. *P. cupularis*; Linn. Sp. Pl. 1651?)—Stalked; turbinate or funnel-shaped, white and downy; disk concave, crimson; margin somewhat crenate.—Found on rotten sticks, imbedded among dead leaves, early in the spring. This is one of the most elegant of the whole order of *Fungi*, whether we consider its delicate downy outside, whose pure white is partly tinged with a pale blush, or the vivid deep crimson of the *disk*, of both which Mr. Sowerby's inimitable figure alone gives any adequate idea. Jacquin's is truly miserable. If this be, as Perfoon believes, the real *cupularis* of Linnaeus, it is singular that neither he nor Vaillant should have noticed the colour of the *disk*. Hudson, Withering, and others have confounded the present plant with the very different *P. aurantia*, see our second section. The *stalk* is often an inch long, or more, and the diameter of the cup an inch and half.

*P. virginica*. Perf. n. 71. (*P. nivea*; Dickf. Crypt. fasc. 1. 21. Sowerb. Fung. t. 65. *Fungoides*, &c.; Mich. Gen. t. 86. f. 15.) Clustered, stalked, hemispherical, white; externally downy.—Frequent on decaying plants, rotten stumps, &c. growing sometimes in a pendulous or reversed posture. The *stalk* is scarcely half a quarter of an inch in height, the *cup* about twice that diameter. Every part is white, and the outside finely downy.

Many other curious and minute species close this section.

Section 4. *Entirely smooth, or at least not manifestly downy, of a rather waxy texture. Mostly of a small size.* Forty-

## PEZIZA.

four species; twenty-four of which are stalked, the rest sessile.

*P. firma*. Perf. n. 87. (*P. ochroleuca*; Bolt. Fung. t. 105. f. 1. Sowerb. Fung. t. 115.)—Rather scattered, leathery, pale brown, cup-shaped; at length dilated, wavy, and flattened. Stalk longer than the cup, blackish at the base.—Said to be not uncommon in the damp recesses of moist woods, growing on dead sticks; but it seems not to have been observed out of England. The full-grown *cup*, when expanded nearly flat, is almost an inch wide; its *disk* of a pale reddish-brown; the outside and internal substance of a light yellowish hue. *Stalk* an inch high, rather slender, swelling upwards. The texture is leathery and elastic, but by drying becomes hard, the whole plant shrinking much.

*P. tuba*. Perf. n. 94. Bolt. Fung. t. 106. f. 1.—Stalked, entirely yellow, funnel-shaped, deeply umbilicated, with a flat entire border. Stalk thread-shaped.—Found, by Mr. Bolton only, on rotten stems of plants, in moist places near rills of water, growing rather dispersed. Each plant is about three quarters of an inch high, of a bright pale yellow, “like a trumpet in miniature,” with a slender, slightly curved, *stalk*. The *disk* a quarter of an inch broad.

*P. citrina*. Perf. n. 106. Sibth. Oxon. 386. With. v. 4. 347. Sowerb. Fung. t. 151. (*Ocospora citrina*; Hedw. Crypt. v. 2. 28. t. 8. f. B.)—Crowded, entirely lemon-coloured, cup-shaped, thick-edged. Stalk inversely conical, the length of the cup.—Found by Hedwig, on rotten oak wood, in shady places, in September. Dr. Sibthorp met with the same in Shotover plantations, in Oxfordshire. A pretty species, growing in considerable clusters, and conspicuous for its bright uniform lemon hue, like *Lichen vitellinus*, Engl. Bot. t. 1792, but never tinged with green or olive. Its usual diameter is a line, more or less, and height about the same. Sometimes the *cup* is obscurely lobed or notched. Mr. Sowerby represents several specimens without any stalk, but we cannot conceive his plant to be materially different from Hedwig’s.

*P. lenticularis*, Perf. n. 110, for which Bulliard t. 300. f. AC, and Sowerby’s *P. aurea*, t. 150, are quoted, the last indeed with doubt, appears rather an obscure species. Though ranged among those with a sessile *cup*, it has actually a stalk; see *Helvella aurea*, Bolt. t. 98. f. 2, and Sowerby’s figure. The colour of the *disk* being a deeper more tawny yellow than the outside, and the thin edge, seem best to distinguish this from the last.

*P. granulosa*. Perf. n. 119. (*P. granulata*; Bull. Fr. t. 438. f. 3. *P. scabra*; Fl. Dan. t. 655. f. 2.)—Sessile, clustered, reddish-orange, flattish; externally paler, granulated and rugged.—Perfoon mentions this as frequent in autumn upon cow-dung. It seems not to have been noticed in England, but may have been confounded with some other. The rugged or granulated outside is a remarkable character. The *disk* is of a bright but pale orange-red, a line broad, with an inflexed margin, which finally disappears, and the whole becomes nearly flat.

*P. confluens*. Perf. n. 120. Obf. Mycol. v. 2. 81. t. 5. f. 6, 7.—Sessile, confluent, somewhat imbricated, orange-coloured, flattish, connected by downy whitish fibres.—Found on the ground, in dry burnt-up spots, by Perfoon, the only author who mentions this singular species, which is among the smallest, though from its aggregate mode of growth very conspicuous. The *seeds*, flying off like smoke, have been observed by its discoverer.

Section 5. *More or less coriaceous, dry, either smooth or powdery, for the most part sessile.* Fifteen species.

*P. patellaris*. Perf. n. 131. (*Lichen atratus*; Hedw. Crypt. v. 2. 61. t. 21. f. A. Ach. Prod. 62.)—Clustered, quite sessile, flat, bordered, black, somewhat coriaceous.—Not uncommon, according to the authors cited, upon dead branches of Lime and Oak, forming patches, more or less scattered, and entirely black. The plants appear like the shields of a *Lichen*, of the Acharian genus *Lecidea*, but totally destitute of a crust. Each is fixed by copious fibrous *roots*, and is about the diameter of a small pin’s head; the *disk* very slightly elevated, the *margin* considerably thickened, and rather raised above the *disk*. Hedwig, observing the minute oblong *seeds* to be discharged separately from their fibrous *receptacle*, without any appearance of the eight-seeded cells of a *Peziza*, referred this diminutive production to *Lichen*; but he is generally supposed to have erred in this point. We have fought for the plant in vain in England, nor can we decide any thing concerning it, though most inclined to the opinion of Perfoon, in which Acharius now concurs.

Several minute, and to us often obscure and uncertain species, close this section. The last of them is

*P. carpinea*. Perf. n. 144. Ehrh. Crypt. n. 130. (*Tubercularia fasciculata*; Tode Fung. fasc. 1. 20. t. 4. f. 32.)—Clustered, stalked, palish, capitate, slightly flattened.—Found on the bark of Hornbeam, through the cuticle of which it protrudes in little dense oblong clusters; gelatinous, and of a flesh-colour, with a yellow tinge, when fresh; brown and hard when dry. Each plant resembles a minute round-headed Agaric, with a thick *stalk*. The surface of the head, or *disk*, is said to be covered with pale yellow grains, thought to be the *seeds*.—In Ehrhart’s specimen these supposed *fungi* evidently spring from the fresh internal bark, not from any decayed layer, which is so contrary to the nature of the whole natural order, that we greatly incline to rank this species with *Tremella*, if not, to discard it altogether as a mere exudation from the bark of the tree!

Section 6. *Receptacle nearly membranous, dry, cup-shaped, sunk into the surface of wood, with a prominent border.* Three species, which Perfoon seems to have inclined to establish as a genus, by the name of *Sitidis*. One example will suffice.

*P. radiata*. Perf. n. 146. (*P. marginata*; Sowerb. Fung. t. 16. With. v. 4. 351. *Lycoperdon radiatum*; Linn. Sp. Pl. 1654. *Patellaria excavata*; Hoffm. Pl. Lich. t. 23. f. 3. *Sphærobolus rosaceus*; Tode Fung. fasc. 1. 44. t. 7. f. 57, 58.)—Oval, immersed, internally brown; border prominent, spreading, snow-white.—On the bark of dead branches of trees. Found by Mr. Relhan at Whitwell, Cambridgeshire. Very conspicuous in consequence of its white, lobed or notched, border. If Linnaeus and Tode be correct, this species discharges the *seeds* elastically, in the form of a ball; consequently it can have no right to be esteemed a *Peziza*, but ranks with the *Lycoperdon Carpbolus*, in a separate genus. Hoffmann, Sowerby, and Perfoon, have described merely the empty receptacle.

Section 7. *Receptacle nearly membranous, elongated, bladder-like, hollow at the base.* This, in some books, forms the genus *Solenia*. Four species.

*P. ochracea*. Perf. n. 149. (*Solenia ochracea*; Hoffm. Germ. v. 2. t. 8. f. 2.)—Rather crowded, slender-pea-shaped, downy, yellow.—Found on the old barks of trees, in rows or clusters, not much crowded, the plants not quite erect, very minute; but visible by their variegated hue of orange and yellow. Each is tubular, white within; the mouth much contracted.

*P. candida*. Perf. n. 151. (*Solenia candida*; Hoffm. *ibid.* t. 8. f. 1.)—Very slender, cylindrical, snow-white, with a revolute margin.—Found on rotten wood. It seems even more minute than the last, from which it is very distinct.

Albertini and Schweiniz, in their learned *Conspectus Fungorum Agri Niskienfis*, have figured and described several species of *Peziza* not in Perfoon, and have furnished valuable remarks on some of his minute or obscure ones. They confirm the account of the fruit of *P. radiata*, n. 146, as being at first gelatinous, then waxy, and finally intermixed with fibres. The same acute observers have seen the *P. carpineæ*, n. 144, twice; in April it had little convex closed cups, and in October a flat open disk. If there be no deception in this, we must allow it to remain here. After all, great obscurity must attend these diminutive productions; nor can such be put to the test of displaying their volatile seeds, in the form of smoke, from an organized disk, which is the only true mark of a *Peziza*.

PEZO *de Rega*, in *Geography*, a town of Portugal, in the province of Tras los Montes, a celebrated depot of Port wine; 7 miles N.W. of Lamego.

PEZOS, a town of Spain, in Asturia; 40 miles W. of Oviedo.

PEZRON, PAUL, in *Biography*, a learned French abbot, who flourished in the 17th and 18th centuries, was born at Hennebon, in Bretagne, in the year 1639. At the age of 22 he embraced the monastic life, and went to pursue his studies at the college of the Bernardines in Paris. He soon became distinguished for his ardour in the pursuit of knowledge, as well profane as sacred; and his early proficiency secured to him the respect and esteem of the abbot, who appointed him his secretary, and procured for him the degree of bachelor of divinity from the faculty of Paris. Honours now flowed in upon him; in 1682 he received the degree of doctor, and in 1690 he was elected vicar-general of the reformed houses belonging to his order in the isle of France. In 1697, Lewis XIV., in order that he might reward literary merit, bestowed on him the abbey de la Char-moye, which he retained till the year 1703, when he resigned it, that he might devote his whole time to study. The intenseness of his application ruined his health, and he died in 1706, in the 67th year of his age. His principal works are; 1. "The Antiquity of Time, restored and defended against the Jews and the New Chronologists;" in which he maintains the chronology of the Septuagint, in preference to that of the Hebrew text of the bible, which he supposes to have been corrupted by the Jews since the destruction of Jerusalem: he also claims for the world a much higher antiquity than is allowed by any other modern chronologer. 2. "An Attempt at a Literal and Historical Commentary on the Prophets." 3. "The Evangelical History confirmed by those of the Jews and Romans," in 2 vols. 12mo. 4. "A Treatise concerning the Antiquity of the Nation and of the Language of the Celts, otherwise called Gauls," &c. Moreri.

PFAFF, in *Geography*, a mountain of Austria, bordering on Stiria.

PFAFFENBERG, a town of Bavaria; 16 miles N. of Landshut.

PFAFFENDORF, a town of Bavaria, in the bishopric of Bamberg; 5 miles E. of Weismain.—Also, a town of Bavaria, in the same bishopric; five miles S.E. of Lichtenfels.—Also, a town of the duchy of Wurzburg; six miles N. of Ebern.—Also, a town of Prussia, in the palatinate of Culm; 10 miles E.S.E. of Culm.

PFAFFENHAUSEN, a town of Bavaria, in the

bishopric of Augsburg, on the Mindel; 21 miles S.W. of Augsburg.—Also, a town of Bavaria; 13 miles N.N.W. of Landshut.

PFAFFENHOFEN, a town of Bavaria, on the Ilm; 14 miles S.S.E. of Ingolstadt. N. lat. 48° 25'. E. long. 11 28'.—Also, a town of Bavaria; 13 miles S.W. of Amberg.—Also, a town of France, in the department of the Lower Rhine; nine miles W. of Haguenuau.

PFAFFENHOVEN, a town of Wurtemberg; eight miles W. of Heilbronn.

PFAFFENREUT, a town of Germany, in the principality of Culmbach; five miles S.S.E. of Wunsiedel.

PFAFFEY, a town of Switzerland, in the canton of Friburg; 10 miles S.E. of Friburg.

PFAFRODA, a town of Saxony, in the circle of Erzgebirg; 75 miles from Freyberg.

PFALDORF, a town of Bavaria, in the principality of Aichstatt; six miles N.E. of Aichstatt.

PFALZEL, a town of France, in the department of the Sarre, and chief place of a canton, in the district of Treves; three miles N.E. of Treves. The place contains 860, and the canton 8370 inhabitants, in 40 communes.

PFANBERG, a town of the duchy of Stiria; 10 miles N. of Gratz.

PFANHEIM, a town of the duchy of Wurzburg; three miles E.N.E. of Aut.

PFANNER, TOBIAS, in *Biography*, son of a counsellor of the count de Oettingen, was born at Augsburg in 1641. He studied at Altdorf, Gotha, and Jena, and acquired a profound knowledge of jurisprudence, philosophy, and other branches of learning. After having been successively governor to several young gentlemen, the duke of Saxe-Gotha made him secretary of his archives, and employed him to instruct his sons in history and politics. In the year 1686 he was nominated counsellor to all the Ernestine line. He was so well versed in public affairs, that he obtained the name of "The living archives of the house of Saxony;" he bore an estimable character, but had, through excessive study, contracted a melancholy disposition. He died in the year 1717, at the age of 76. He was author of many works written in the Latin language, of which the principal are, "A History of the Peace of Westphalia;" "A Treatise on German Princes;" "A Treatise on the Principle of Historical Faith," &c. &c. Moreri.

PFASKIRCHEN, in *Geography*, a town of Austria; five miles N.E. of Putzheimdorf.

PFEEDERSHEIM, a town of France, in the department of Mont Tonnerre; 24 miles N.N.W. of Spire.

PFESSION, a town of Switzerland, in the canton of Zurich; 10 miles E. of Zurich.

PFETER, a town of Bavaria, on a small river of the same name; 14 miles E. of Ratibon.

PFIN, a town of Switzerland, in the Valais; 12 miles E. of Sion.

PFLAU, a town of Tyrol; 16 miles W. of Bolzano.

PFORING, a town of Bavaria, encompassed with walls, on the Danube; 14 miles E. of Ingolstadt.

PFORTEN, a town of Lusatia; 12 miles S. of Guben.

PFORZHEIM, a town of Baden, on the Entz, which here receives the Nagold and Warm. It comprehends a special superintendance, a grammar-school, and an orphan-house; 8 miles S.S.E. of Durlach. N. lat. 48° 58'. E. long. 8 50'.

PFRAME, a town of Austria; 6 miles S.S.W. of Marcheck.

PFRIMBOLDT, a town of Bavaria, in the principality of

of Leuchtenberg, on the Nab; 15 miles S.W. of Leuchtenberg.

PFULLENDORF, a town of Baden, made imperial in 1204, and continued such till the year 1802, when it was given among the indemnities to the margrave of Baden; 14 miles W.N.W. of Ravenspurg. N. lat. 47° 52'. E. long. 9° 18'.

PFUNT, a town of Tyrol; 15 miles W. of Bolzano.

PFYN, a town of Switzerland, in the canton of Zurich, and capital of a bailiwick; 7 miles W. of Constance.

PHACA, in *Botany*, a name borrowed by Linnæus from Dioscorides, whose  $\varphi\alpha\kappa\omicron\varsigma$ , nevertheless, the Lentil *Erythrum* (or more properly *Cicer*) *Lens*, agrees no further with the Linnæan genus, than in being a papilionaceous and leguminous plant.—Linn. Gen. 384. Schreb. 507. Willd. Sp. Pl. v. 3. 1251. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 4. 358. Sm. Prodr. Fl. Græc. Sibth. v. 2. 84. Juss. 358. Gært. t. 154. (Astragaloides; Tourn. t. 223.)—Class and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminosæ*, Juss.

*Cal.* Perianth inferior, of one leaf, tubular, five-toothed. *Cor.* papilionaceous: standard obovate, straight, largest; wings oblong, obtuse, shorter; keel short, compressed, obtuse. *Stam.* Filaments diadelphous, one set of nine, the tenth solitary; anthers roundish, ascending. *Pist.* Germen oblong; style awl-shaped, ascending; stigma simple. *Peric.* Legume oblong, inflated, half divided into two cells; the upper future depressed towards the lower. *Seeds* several, kidney-shaped.

*Obf.* The legume in some is straight, but in others recurved, in some that the point sometimes touches the base. As the partition of the legume of some *Astragali* is not actually attached to the lower future, though brought very near to it, the close affinity between these two genera is evident.

*Eff. Ch.* Calyx with five teeth; the two upper ones most distant. Legume divided half way into two cells, inflated.

1. Ph. *batica*. Hairy Bastard Vetch. Linn. Sp. Pl. 1064. (Astragalus primus, five bœticus; Clus. Hist. v. 2. 233, 234. A. lusitanicus Clusii; Lob. Ic. v. 2. 78. Ger. Em. 1238.)—Hairy. Stem erect. Leaflets numerous, oval. Stipulas linear-lanceolate. Legume oblong, boat-shaped, somewhat depressed.—Native of Portugal, Spain, and Greece. Dr. Sibthorp found it plentifully on mountains in the isle of Cyprus. We have a specimen gathered by the late Dr. Broussonet in Barbary. Clusius saw it flowering in the end of January, in Spain. Though this noble plant stands on the list of our horticultural riches, it is only from having been cultivated here in Parkinson's days. Some traveller would do well to restore it to us. The root is perennial, spindle-shaped, very thick and strong. Stems herbaceous, erect, about two feet high, as thick as the little finger, nearly simple, leafy, slightly angular, a little zigzag, reddish, clothed, like every other part of the herbage, with fine, soft, hoary hairs. Leaves alternate, about six inches long, pinnate, of nine pair, with an odd one, of stalked, elliptical, uniform, entire leaflets, of a hoary or glaucous green. Stipulas not quite an inch long, linear-lanceolate, almost awl-shaped, erect, reddish. Flowers copious, large, and handsome, pure white, pendulous, in long, solitary, axillary, stalked, upright clusters, about the length of the leaves. Legume near two inches long, straight, cylindrical, slightly depressed, channelled along the back. The modern Greeks know this plant by a name equivalent to Wild Lupine; the Portuguese call it Dog Lu-

pine. The taste of the leaves, and especially the seeds, is said by Clusius to be acrid and burning.

Whatever may become of *Robinia vesicaria*, Jacq. Ic. Rar. t. 148, we cannot follow Willdenow in introducing it here.

2. Ph. *falsula*. Salt Bastard-Vetch. Willd. n. 3. Linn. Suppl. 336. Pallas Reise v. 3. append. n. 115. t. B, b.—Hoary. Stem erect. Leaflets numerous, obovate; smooth above, stipulas oblong. Legume globose, pendulous.—Gathered by Pallas in salt ground, about the lake *Tareï*, in Dauria.—This is, in all its dimensions, scarcely half the size of the preceding, and distinguished by being finely hoary in every part, (except the upper surface of the leaves, which is glaucous,) with fine, close-pressed, short pubescence. The flowers are much fewer, not above six or eight in each cluster, and of a fine red. Legumes globose, stalked, pendulous. It flowers in its native country about the end of June, and has never been observed in any other spot than the above-mentioned.

3. Ph. *alpina*. Alpine Bastard Vetch. Linn. Sp. Pl. ed. 1. 755. Willd. n. 4. Jacq. Ic. Rar. t. 151. Villars Dauph. v. 3. 472. (Ph. leguminibus pendulis, semiovatis; Gmel. Sib. v. 4. 35. t. 14. Astragalus n. 410; Hall. Hist. v. 1. 175. Astragaloides alpina hirsuta erecta, foliis vicis, floribus dilute luteis; Till. Pif. 19. t. 14. f. 2.)—Erect, branched; somewhat hairy. Leaves of many pair of elliptic-lanceolate obtuse leaflets. Legumes half-ovate, acute. Stipulas linear-lanceolate.—Native of the mountains of Switzerland, France, Savoy, Austria, and Siberia, from all which countries we have specimens. The root is perennial, woody, very long and strong, subdivided. Stems erect, about two feet high, branched, leafy, more or less clothed with short, close-pressed, white hairs. Leaves alternate, two or three inches long, composed of from ten to fourteen pair, with an odd one, of elliptic-oblong, or somewhat lanceolate, obtuse leaflets, whose medium length is half an inch, clothed, especially beneath, with such hairs as the stem. Stipulas nearly linear, broad at the base, from a quarter to half an inch long, smooth on both sides, but fringed at the edges. Flowers yellow, in shortish, long-stalked, axillary clusters, with linear, fringed bractæas. Partial footstalks short, slightly drooping, clothed, as is the calyx in some degree, with short black hairs. The germen is very densely so clothed, but the legumes become smooth, and are stalked, pendulous, scarcely an inch long, inflated, half-ovate, the back being nearly a straight line. Seeds usually three or four.

This being certainly the original *Ph. alpina* of Linnæus, that name is properly retained for it, though he sometimes confounded this and the following.

4. Ph. *frigida*. Northern Bastard-Vetch. Linn. Syst. Nat. ed. 10. 1173. Fl. Lapp. ed. 2. 227. Willd. n. 5. Jacq. Austr. t. 166. (Ph. alpina; Linn. Sp. Pl. 1064. Fl. Succ. ed. 2. 256. Ait. n. 2. Fl. Dan. t. 856. Astragalus n. 402; Hall. Hist. v. 1. 176.)—Stem erect, unbranched, smooth. Leaves of about five pair of ovate, slightly hairy, obtuse leaflets. Legumes oblong. Stipulas broad-ovate, reflexed.—Native of the alps of Lapland and Norway, as well as of the more lofty mountains of Austria and Switzerland. Differs from the last in being usually of a more humble stature, though in its separate parts much larger. The above characters sufficiently mark the essential distinctions. The leaflets are an inch long, and nearly half as broad, smooth above. Stipulas very large and broad, fringed, or hairy. Flowers cream-coloured, drooping. Legumes pendulous, somewhat boat-shaped, slightly hairy, narrower, and scarcely longer than the former.

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The *stem* in our two Lapland specimens appears to have been two feet high, and the *flowers* are much more numerous than in those from Austria and Switzerland, whose utmost height is ten or twelve inches. Hence the plants look very different, and that difference gave rise to the observation in the *Fl. Lapponica*; but we submit to the opinion of those who consider them as one and the same. We agree moreover with Willdenow, that the *leaves* are incorrectly shaped in *Fl. Dan.* The *flowers* also are too yellow. Haller misapplies Tilli's t. 14. f. 2. to this species.

5. *Ph. australis*. Cloven-winged Bastard-Vetch. Linn. Mant. 103. Willd. n. 6. Ait. n. 3. Jacq. Misc. v. 2. 43. t. 3. (Ph. Halleri; Villars Dauph. v. 3. 473. t. 41. Astragalus n. 403; Hall. Hist. v. 1. 176. Astragaloides alpina supina glabra, foliis acutioribus; Till. Pis. 19. t. 14. f. 1.)—Stems decumbent, branched. Leaves of about eight pair of elliptic-lanceolate leaflets, smooth above; the odd one nearly sessile. Wings of the corolla cloven at the extremity.—Native of the alps of Switzerland, Dauphiny, and Austria.—The *stems* are several, more or less decumbent, branched, from three to twelve inches long, generally almost entirely smooth. *Leaflets* clothed beneath only with close-pressed minute hairs; the terminal one usually on the same kind of short stalk as the rest, without any elongation of the common stalk. *Flowers* white, with purple-tipped keel, their wings remarkable for being deeply cloven at the summit. *Legumes* pendulous, oblong, smooth, as is even the *germen*.

6. *Ph. Gerardi*. Trailing Bastard-Vetch. Villars Dauph. v. 3. 474. (Phaca; Ger. Gallopr. 519?)—Stems decumbent, branched. Leaves of about ten pair of elliptical leaflets, hairy on both sides. Wings of the corolla linear, entire. *Germen* hairy.—Native of the alps of Dauphiny and Switzerland. This is certainly essentially different from the last, in its entire *wings*. The *stems*, as well as both sides of the *leaves*, are hairy; *leaflets* more elliptical, and rather more numerous; the odd one attended by an elongation of the common stalk. *Flowers* white; their *stalks*, *calyx*, and especially *germen*, clothed with black hairs. *Wings* certainly entire. Villars says the *legume* is a little hairy.

A specimen of Mr. Chamier's plant, obtained from Kew garden in 1781, has the young *leaves* very hairy on both sides, and the *calyx* also black, woolly, and hairy. But its smooth *germen* and cloven *wings* prove it the true *Ph. australis*. We cannot decide positively concerning Gerard's plant, as he un luckily says nothing about the *wings*.

7. *Ph. arenaria*. Sand Bastard-Vetch. Willd. n. 7. Ait. n. 4. Pallas Reise v. 3. append. n. 116. t. C. c. f. 1, 2.—Stems ascending, smooth, nearly simple. Leaves of about five pair of lanceolate smoothish leaflets; the odd one nearly sessile. *Legumes* globular, erect.—Native of sandy ground in Siberia, about the Uda, flowering in May. The form and position of the *legumes* distinguish this from the two last, to which it seems otherwise nearly akin. We have seen no specimen.

8. *Ph. buliacoba*. Reticulated Bladder Bastard-Vetch. Willd. n. 8.—“Stems proeumbent. Leaves of about five pair of oblong, acute, hoary leaflets; the odd one nearly sessile. Calyx inflated, ovate, reticulated, hairy.”—Native of Galatia. *Stems* several, short. *Leaflets* clothed on both sides with shaggy hoary hairs. *Clusters* axillary, stalked, of from three to five yellow *flowers*. *Calyx* ovate, inflated, as big as a gooseberry. Like *Ph. incana* hereafter described, but caulescent, with smaller *leaflets*, and larger *calyx* and bractæas. Willd.

9. *Ph. densifolia*. Crowded-leaved Bastard-Vetch.—Stem decumbent, branched, smooth. *Leaflets* numerous, crowded, obovate, emarginate, villous beneath. *Calyx* woolly. *Le-*

*gume* turgid, ovate, nearly smooth.—Gathered by Mr. Menzies in California. The habit and size of this curious non-descript species somewhat approach to the two first, but the decumbent mode of growth distinguishes it from them. The copious *leaves*, about three inches long including their stalk, and their crowded, emarginate, folded *leaflets*, consisting of from 16 to 20 pair, woolly underneath, are altogether peculiar. The *stipulas* are very broad, ovate, concave, smooth except the point. *Flower-stalks* axillary, thrice as long as the leaves, each bearing an oblong dense *cluster*, of reddish drooping *flowers*. The *legume* is not unlike that of a *Colutea*, an inch and a half long, ovate, pointed, turgid, polished, with a few minute hairs near the point.

10. *Ph. vesicaria*. Smooth Bladder Bastard-Vetch. Linn. Mant. 103. Willd. n. 10. Vahl Symb. v. 1. 57. Schreb. Dec. 5. t. 3. (Astragaloides orientalis vesicaria, foliis et fructibus glabris; Tourn. Cor. 27.)—Stem none. *Calyx* of the fruit inflated, smooth. *Leaflets* lanceolate, nearly naked, acute.—Gathered by Tournefort in Armenia. Schreber sent a specimen to Linnæus. *Root* woody and perennial. *Stem* none. *Leaves* several, of numerous pairs of narrow acute *leaflets*, quite smooth above, but their under side bears a few close-pressed hairs. *Flower-stalk* solitary, radical, bearing an erect lax *cluster*, or *spike*, three or four inches long, of large handsome *flowers*, whose tubular downy *calyx*, after flowering, becomes inflated, nearly globose, finely reticulated, quite smooth, and tinged with purple. The *legume* within is small and oblong.

11. *Ph. incana*. Hoary Bladder Bastard-Vetch. Vahl Symb. v. 1. 57. Willd. n. 11. (Astragalus anthylloides; Lamarek Dict. v. 1. 320. Astragaloides orientalis vesicaria, foliis et fructibus incanis; Tourn. Cor. 27.)—Stem none. *Calyx* of the fruit inflated, villous. *Leaflets* ovate, silky, obtuse.—Gathered by Tournefort in Armenia. Habit of the last. *Leaves* of about 20 pair of ovate, obtuse, sometimes emarginate *leaflets*, hoary on both sides with silky hairs. *Stalks* hoary, taller than the leaves. *Flowers* yellow. *Calyx* ovate, inflated, at length globose, coloured, clothed with very soft down. An elegant species, which we have seen in Tournefort's herbarium, evidently akin to the last, but abundantly distinct.

In the *Supplementum* of Linnæus we find *Ph. sibirica*, *prostrata*, *microphylla* and *muricata*, the three latter of which are in the Linnæan herbarium. The descriptions of Pallas induced the younger Linnæus to refer these plants to *Phaca*; but Pallas himself afterwards removed them to *Astragalus*, where they stand in the early part of Willdenow's fifth section, with others in the same predicament; Willd. Sp. Pl. v. 3. 1298—1301. Their habit certainly accords with other *Astragali*. As to the character of the *legume*, it must be confessed to be very obscure and uncertain, in almost every case.

*Ph. trifoliata*, Linn. Mant. 270. Willd. n. 9, alone remains to be noticed. Of this a specimen from China is in the Linnæan herbarium, nor could any person surely have guessed at the plant without seeing the specimen. Its habit is that of a three-leaved *Hedysarum*, but the inflated semi-orbicular *legumes* cannot accord with that genus. These *legumes* however are described on the specimen as unilocular, which they truly are; so that the plant has no more of the character than the habit of a *Phaca*, in which genus it can by no means remain. Having no *flowers*, we can determine nothing certain, but according to the Linnæan ideas of *Glycine*, it might be removed to that genus. In many points it accords with the new genus *Flemingia*, Ait. Hort. Kew. v. 4. 349, but the seeds are four or five, instead of being two only.

The *stem* is slender, branched, partly downy. *Leaves* ternate, very unequal in size; *leaflets* obovate, entire, an inch long at most; minutely hairy on both sides; finely reticulated with veins beneath. *Footstalks* short, hairy. *Stipules* half-ovate, ribbed, chaffy, hairy, taper-pointed, deciduous. *Cluster* terminal, of about 20 flowers, in pairs, on downy glandular stalks. *Legumes* half an inch long, transversely veiny, nearly smooth.

PHACELIA, a genus of Jussieu's, to which he applied this name, in allusion "to the clustered spikes, from *σφαῖρος*, a bundle;" the figures of both species nevertheless have racemose flowers. Juss. Gen. 129. Michaux Boreal-Amer. v. 1. 134.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Asperifoliae*, Linn. *Borragineae*, Juss.

Jussieu gives the following character.—"Calyx in five deep segments. Corolla nearly bell-shaped, five-cleft, with five furrows at the base internally, whose membranous margins embrace the bottom of the filaments. Stamens prominent. Style short. Stigmas two, long. Capsule of two cells, four seeds, and two valves each with a partition from its middle, and containing one seed in each half cell. The herb is downy; with alternate pinnate leaves. Flowers turned one way, in upright, fasciculated, terminal spikes. From an old specimen."—Michaux extracts a part of the above character only, without any alteration or addition. His plate represents a very long capillary style.

1. *Ph. pinnatifida*. Mich. n. 1. t. 16.—"Erect. Leaves pinnatifid; their segments cut and lobed. Spikes mostly cloven, oblong, many-flowered. Corolla blue; its lobes with a nearly simple margin."—Native of the western woods of the Allegany and Kentucky mountains. The *stem* is round, alternately branched. *Leaves* alternate, stalked, deeply pinnatifid, or pinnate, with opposite, pinnatifid or cut, segments, apparently smooth. *Clusters* terminal, solitary, downy, of about seven flowers turned one way, on partial stalks half an inch long. *Fruit* globose, crowned with the permanent style.

2. *Ph. fimbriata*. Mich. n. 2. (*Heliotropium pumilum glabrum, nasturtii foliis, americanum*; Pluk. Phyt. t. 245. f. 5).—"Procumbent, somewhat ascending. Leaves pinnatifid; their segments undivided. Spike solitary, short. Corolla white; its lobes fringed."—Native of lofty mountains in Carolina.

Such is Michaux's account. His latter species however should seem, by the synonym, to be no other than *Ellisia Nyctelæa*. The figure cited proves on examination to be the original from whence Morison copied his sect. 11. t. 28. f. 3, which is certainly the *ELLISIA*; see that article. Probably therefore the *Phacelia bipinnatifida* may prove a new species of *Ellisia*; for most assuredly nothing is said of it that gives any room to suppose it a distinct genus.

PHACOIDES, a word used by the ancient physicians to express any thing that in size and shape approached to a lentil. Thus the crystalline humour of the eye was so called.

PHACOPTISANA, a medicine often mentioned by the ancient writers as a nourishing and strengthening thing: it was a ptisan with lentils.

PHACO'SIS, from *φακς*, a lentil, a black spot in the eye, resembling a lentil.

PHÆCASIA, in *Antiquity*, a kind of shoes.

PHÆDO, in *Biography*, a Greek philosopher, founder of the *ELIAC school*, to which article we refer our readers for particulars relating to him.

PHÆDRUS, well known for his fables, was a native of Thrace, and probably brought to Rome at an early age, in the condition of a slave. He came into the service of the

emperor Augustus, by whom he was enfranchised, as appears from the title prefixed to his work of "Augusti Libertus." Of his life nothing more is known, except that in the reign of Tiberius he was a sufferer under the injustice and tyranny of Sejanus, whom he survived. It is probable he lived to an advanced age. He was author of five books of fables, composed in Iambic verse. They are valuable for their precision, purity, elegance, and simplicity. The matter of these fables is generally borrowed from Æsop, but Phædrus intermixes stories or history-pieces of his own. This work appears to have been little known in his own time, for no extant writer of antiquity alludes to it. This circumstance, together with the assertion of Seneca, "that the Romans had not attempted Fables and Æsopian compositions," might throw a suspicion on the genuineness of the work, did not its style and manner refer it to the best age of Roman literature. It remained unknown to the moderns till 1595 or 1596, when Francis Pithou discovered a copy in the library of St. Remi at Rheims, and sent it to his brother Peter, who published it. Two manuscripts of Phædrus are said to exist, both of which are not only imperfect, but being transcribed from the same copy very carelessly, they are full of errors; hence few ancient works have given more trouble and room for conjecture to critics. The best editions of Phædrus are those of Burmann 4to. 1727; Hoogstraten 4to. 1701; and Barboiu 12mo. Paris 1754.

PHÆNIX, the name of an ancient musical instrument, which, according to Musonius, was used by the king of Thrace in the national festivals: its invention is attributed by some authors to the Phœnicians, probably from the analogy between the two names.

PHÆNOGAMOUS PLANTS, in *Botany*, from *φανω*, to show, or make apparent, and *γαμος*, marriage; a term invented, if we mistake not, by the German botanists, for such vegetables as have the parts of the flower, or organs of impregnation, evident and intelligible, like the generality of plants. The term therefore is opposed to Cryptogamous Plants. See CRYPTOGRAMIA.

PHÆNOMENON, or PHENOMENON, *φαινόμενον*, formed from *φαίνωμι*, I appear, strictly an appearance in physics, an extraordinary appearance in the heavens, or on earth; either discovered by observation of the celestial bodies, or by physical experiments; and whose cause is not obvious. Such are meteors, comets, uncommon appearance of stars and planets, earthquakes, &c. Such also are the effects of the magnet, phosphorus, &c.

The phenomena of comets are inconsistent not only with the solidity of the heavens, supposed in the Ptolemaic hypothesis, but equally with the plenitude of the heavens, asserted by the Cartesians.

That hypothesis is best which solves most phenomena. Sir Isaac Newton shews, that all the phenomena of the heavenly bodies follow from the attraction of gravity, which intercedes those bodies; and almost all the phenomena of the lesser bodies from the attraction and repulsion between their particles; so simple is nature.

PHÆNOMENON, *Parallax of a*. See PARALLAX.

PHÆOPUS, in *Ornithology*, a species of *Scolopax*; which see.

PHAËTHUSA, in *Botany*, so called by Gartner, from *φαι*, to shine, in allusion to the great size of the plant, its very abundant yellow flowers, and consequently striking appearance. The name is borrowed from heathen mythology; the nymph who bore it having been one of the sisters of Phæton. Gartn. v. 2. 425. t. 169. f. 3. Schreb. 571.

Willd.

Willd. Sp. Pl. v. 3. 2221. Mart. Mill. Dict. v. 3. Lamarck Illustr. t. 689.—Class and order, *Polygamia superflua*. Nat. Ord. *Compositæ oppositifoliæ*, Linn. *Corymbifera*, Juss.

Gärtner founded this supposed new genus on the *Siegesbeckia occidentalis* of Linnæus, under the following essential character.

Calyx nearly cylindrical, of many imbricated unequal leaves, recurved at their tips. Receptacle chaffy. Perfect florets several in the disk; female one or two, ovate-oblong, cloven at the point, in the radius; all fertile. Seeds hispid, without seed-down.

Michaux, finding that the plant in question had awns to the seed, referred it to *Verbena*, and concluded the *Phaëtusa* of Gærtner to be something else. But it appears to us, from examining original specimens of Linnæus and Gronovius, which leave no doubt of what they intended, that Gærtner's plant is precisely their's, and that either he has made a mistake, in overlooking the two very conspicuous rough bristly awns which crown the germen and seed, or that such may occasionally be wanting. In either case his *Phaëtusa* cannot be maintained; for no person surely would insist on the small number of radiant florets. Michaux seems right in referring this plant to *Verbena*, in which he is followed by Willdenow and Aiton. The younger Linnæus judged it, by the seeds, to be a *Coreopsis*, but it wants several characters, as well as the habit, of that genus. See VERBESINA.

PHÆTON, in *Ornithology*, the Tropic bird, a genus of birds of the order Anseres. The generic character is, bill sharp-edged, straight, pointed, the gape of the mouth reaching beyond; nostrils oblong; hind toe turned forwards. Of this genus there are three species; they inhabit the South-sea, particularly between the tropics, and are often seen upon the backs of porpoises. In all of them the bill is compressed, and bent a little downwards, the lower mandible angulated. The feet have four toes, which are palmated. The tail is cuneiform, and distinguished by the great length of the two intermediate feathers.

#### Species.

ÆTHEREUS; common Tropic bird. White; back, rump, and lesser wing-coverts streaked with white; the two middle tail-feathers black at the base; bill red. It is about 34 inches long, and is the size of a wigeon. It flies very high, and at a great distance from land; feeds on young sharks, dolphins, and albigores. On land, where it is rarely seen, except in the breeding season, it sits on trees, and builds on the ground, in woods. It is well known to most of our navigators, to whom it generally announces their approach to the tropic, though this indication cannot be relied on as infallible, as the species will wander to the latitude of 47½. There are two varieties; 1. White; band over the eyes, scapulars towards the extremity, band above the wings, and shafts of the tail-feathers at the origin, black; 2. Body pale and tawny.

MELANORHYNCHOS; Black-billed Tropic bird. Streaked black and white, beneath white; bill black; quill-feathers tipped with white, tail-feathers with black. It is found in Palmerston and the Turtle islands, and is nearly 20 inches long. There is a fine black streak before and behind the eyes; the front is white.

PHENICURUS; Red-tailed Tropic bird. Rosy flesh-colour; bill and two middle tail-feathers red. It is found in Mauritius island, is 34 inches long, of which the two middle tail-feathers measure 21 inches; it builds in hollows in the ground under trees, and lays two yellowish-white eggs with rufous spots.

PHÆUS, in *Zoology*, a species of *Mus*; which see.

PHAGEDÆNA, from φαγεῖν, to eat, a term in *Surgery*, applied to an ulcer, when it presents an unhealthy appearance, and spreads, as it were, by eating the parts away, common remedies not having the power of curing the disease.

PHAGEDÆNIC MEDICINES, such as are used to eat off fungous or proud flesh.

PHAGEDÆNIC Ulcer. See PHAGEDÆNA, and ULCER.

The Ephemerides of the academy of the Curiosi Naturæ relate, that phagedænic ulcers have been frequently cured only with sheep's dung.

PHAGEDÆNIC Water, in *Chemistry*, denotes a water made from quick-lime and sublimate; so called from its efficacy in the cure of phagedænic ulcers.

To prepare this water, they put two pounds of fresh quick-lime in a large earthen pan, and pour upon it about ten pounds of rain-water; these they let stand together two days, stirring them frequently; at last leaving the lime to settle well, they pour off the water by inclination, filtrate it, and put it up in a glass bottle, adding to it an ounce of corrosive sublimate in powder; which, of white, becomes yellow, and sinks to the bottom of the vessel. The water, being settled, is fit for use, in the cleansing of wounds and ulcers, and to eat off superfluous flesh, and especially in gangrenes; in which case may be added to it a third or fourth part of spirit of wine.

PHAGESIA, φαγισια, in *Antiquity*, a festival in honour of Bacchus, celebrated during the Dionysia.

It was otherwise called *phagesiposia*, φαγισπιοςια; which names come from φαγεῖν, to eat, and πινειν, to drink; because it was a time of good cheer.

PHAGON, φαγων, a festival of the same nature with that called Phagesia.

PHAGRUS, or PAGRUS, in *Ichthyology*. See SPARUS.

PHAGUS, in *Botany*, a name given by many authors to the esculus, or sweet and esculent oak, found in Greece and Dalmatia.

PHAIUS, so called by Loureiro, Cochinch. 529, from φαίος, brown, is evidently, by his description, the beautiful *Limodorum Tankervilleæ*, cultivated in the gardens of China and Cochinchina, for the sake of its flowers, the upper surface of whose petals is of a brown hue, very unusual in those parts of a flower.

PHALACRA, a word used by Hippocrates to express all the blunt instruments used in surgery; such as probes and others, with buttons at the ends.

PHALACROCEPHALUS INDICUS, in *Ichthyology*, the name of an anadromous fish of the East Indies. Its neck and head appear naked and bald, as it were; it is all over of a greyish-white in colour, and is variegated with red spots about the mouth; the eyes are large and very prominent, and their irises yellow; its usual size is about a foot and a half in length, and it lives part of its time in the sea, and part in rivers; it is an extremely delicate tasted fish, and esteemed one of the finest of that part of the world. It is called by the Dutch *kaelkop*.

PHALACROCROX, in *Ornithology*. See PELECANUS Carbo.

PHALÆNA, the Moth, in *Entomology*, a genus of insects of the order Lepidoptera, whose generic character is: Antennæ setaceous, and gradually tapering from the base to the tip; the tongue is spiral; it has no jaws, and the wings, when at rest, are generally deflected: the flight is nocturnal. There are more than 1500 species, divided into sections, which are subdivided into still smaller assortments.

# PHALÆNA.

In our enumeration of the species, we shall wholly pass over those which are the least interesting to scientific readers. Moths fly abroad only in the evening, and during the night, and obtain their food from the nectar of flowers. The larva is active and quick in motion, mostly smooth, more or less cylindrical, and it preys voraciously on the leaves of plants. The pupa is torpid or quiescent, more or less cylindrical, pointed at the tip or at both ends; and is generally inclosed in a follicle. The following are the divisions of the moth tribe, according to the Linnæan system, which we shall follow.

**BOMBYX.** Antennæ filiform; two feelers, which are compressed and reflected; tongue short, membranaceous, obtuse, and bifid; the larva is sixteen-footed, often hairy; the pupa is pointed at the tip.

- |               |   |                    |
|---------------|---|--------------------|
| Subdivisions. | { | a. Wings expanded. |
|               |   | b. ———— reversed.  |
|               |   | c. ———— deflected. |
|               |   | d. ———— incumbent. |
|               |   | e. ———— convolute. |

It should be observed that Dr. Shaw and others have divided the section Bombyx into two sections, *viz.* Attaci; and Bombyces properly so called. The reader will therefore bear in mind that the Linnæan Bombyces include the Attaci of other naturalists.

**GEOMETRA.** Antennæ filiform; feelers cylindrical; tongue projected, membranaceous, setaceous, bifid; the larva is from eight to ten-footed, six of which are pectoral, two caudal, and sometimes two sub-caudal; the pupa is pointed at the tip.

- |               |   |                       |
|---------------|---|-----------------------|
| Subdivisions. | { | a. Antennæ pectinate. |
|               |   | b. ———— setaceous.    |
|               |   | c. Wings forked.      |

**NOCTUA.** Antennæ setaceous; feelers compressed, hairy, the tip cylindrical and naked; tongue projecting, horny, setaceous, bifid; larva sixteen-footed; pupa pointed at the tip.

- |               |   |  |
|---------------|---|--|
| Subdivisions. | { | a. Wings expanded.                     |
|               |   | b. ———— flat incumbent, thorax smooth. |
|               |   | c. ————, ———— crested.                 |
|               |   | d. ———— deflected, thorax smooth.      |
|               |   | e. ————, ———— crested.                 |

**HYBLEA.** Antennæ setaceous; feelers projecting, compressed, dilated in the middle; the lip is projecting and acute.

**HEPIALUS.** Antennæ moniliform; feelers two, reflected, hairy, between which is the rudiment of a bifid tongue; the larva is sixteen-footed, feeding on the roots of plants; the pupa is folliculate, cylindrical, and pointed at the tip.

**COSSUS.** Antennæ short, filiform; two feelers, very short, cylindrical, reflected.

**PYRALIS.** Antennæ filiform; the insects of this division have likewise two feelers, which are equal and almost naked; they are cylindrical at the base, the middle is dilated into an oval, and subulate at the tip; the tongue is projected, setaceous, and bifid; the wings are very obtuse, and slightly curved at the exterior margin; the larva is sixteen-footed, and rolling up the leaves to which it attaches itself.

**TINEA.** Antennæ setaceous; four feelers, which are unequal; the larva is found in houses among linen and woollen cloths, and furniture, in which it eats holes, and to which it is very destructive.

**ALUCITA.** Antennæ setaceous; two feelers, that are divided as far as the middle; the inner division is very acute.

**PTEROPHORUS.** Antennæ setaceous; two feelers, that are linear and naked; the tongue is exerted, membranaceous, and bifid; the wings are fan-shaped, divided down to the base, and generally subdivided as far as the middle; the larva is sixteen-footed, ovate and hairy; the pupa is naked, and subulate at the tip.

The foregoing divisions, like those of the genus Papilio, are not strictly accurate, and therefore must be regarded with a proper degree of allowance.

BOMBYX.

a. *Wings expanded.*

Species.

**ATLAS.** This is the largest and most splendid of the Phalænæ known: the specific character is; wings falcate, varied with yellow, white, and ferruginous, with a transparent spot on each; that on the upper pair with a contiguous smaller one. The extent of the wings of this insect measures between eight and nine inches; the ground colour is a very fine deep orange-brown, and in the middle of each wing is a large sub-triangular transparent spot or patch, resembling the appearance of a piece of Muscovy tale; each of these transparent parts is succeeded by a black border, and across all the wings run lighter and darker bars, exhibiting a very fine assortment of varying shades; the upper wings are slightly curved downwards at their tips, in a falcated manner, and the lower wings are edged with a border of black spots, on a pale buff-coloured ground; the antennæ are widely pectinate, with a quadruple series of fibres, exhibiting a highly elegant appearance. This insect is found in America and the East Indies, and varies in size and colours. The larva is verticillate, with hairy tubercles, and it spins a web of strong yellowish silk, that is difficult to be untwisted.

**HESPERUS.** Wings falcate, varied with white and yellow, and ferruginous, with an ovate transparent spot on each; the lower ones are rounded. This is an American insect, as are the next two.

**AUROTUS.** Wings falcate, both surfaces alike, yellowish, with a whitish band and transparent lunule on the disk. A specimen is in the museum of Dr. Hunter.

**CECROPIA.** Wings grey, with a fulvous band; upper pair with a sub-hyaline ferruginous eye.

**IRIUS.** Wings pale orange; upper pair with a transparent spot; lower ones with a black eye, the pupil is transparent. This and the next are Indian insects, and with many other species of this genus, specimens are preserved in the museum of Mr. Francillon.

**SATURNUS.** Wings grey, with a transparent spot; the lower ones have a black eye; the pupil being half closed.

**PAPHIA.** Wings falcate, both surfaces alike, yellow, with rufous streaks and a transparent eye. Found in many parts of Asia.

**POLYPHEMUS.** Wings falcate, yellowish-grey, with a central, ocellate, transparent eye on each; that on the lower pair is large and blueish. The larva of this insect is green, and the pupa yellowish-brown.

**DIONE.** Wings yellow, with two streaks, the anterior of which is interrupted and of a flesh colour, with a transparent eye. It inhabits Guinea.

**CYTHÆREA.** Wings grey, with cinereous streaks and a transparent eye. Found at the Cape of Good Hope.

**MYLITTA.** Wings falcate, yellow, with a ferruginous streak

## PHALÆNA.

freak and divided transparent eye. It is found in different parts of India.

**PROMETHEA.** The wings of this species are slightly falcate, edged with grey, the upper pair is marked with a black eye on each side. The larva is of a green colour, dotted with black, with four red spines.

**ERYTHRINÆ.** Wings brownish, with a waved pale streak. The larva is yellowish, with black spiracles, and four black spines on the collar, and two near the tail.

**CONSPICILLATOR.** The wings of this are falcate, the upper pair brown, with a paler sigmoid streak; the lower ones are black, with a large red eye. This is a native of Amboina; a specimen is in the British Museum.

**JANUS.** Upper wings variegated, with a black eye beneath; lower ones red, with a black eye. It is found in Surinam.

**CERTHIA.** Wings rounded, brown, the tip cinereous, with white and brown waves. Found at Chufan.

**MEGÆRA.** Upper wings blue, spotted with white; lower ones white in the middle, the tip blue, with yellow waves. Found in North America.

**HIPPODAMIA.** Wings slightly falcate, brown, with a paler margin, in which is an uninterrupted white streak on the upper pair. It inhabits Surinam.

**NICTITANS.** Wings brown, flesh-colour; lower pair with a ferruginous eye, the pupil transparent. It inhabits Africa, as do the three following.

**SEMI RAMIS.** The wings of this species have very long tails of various colours, with a transparent dot on each.

**BOREAS.** Wings tailed, cinereous, varied with brown; upper pair with two, the lower ones with a single transparent dot.

**LUNA.** Wings tailed, both surfaces alike, pea-green, with a transparent lunule eye on each side. This is a large and extremely beautiful insect; its colour is a most elegant pea-green, with a small yellowish eye-shaped spot, with a transparent centre in the middle of each wing, and the lower wings are produced at the bottom into a long and broad tail, or continuation; the ridge of the upper wings is broad, and of a fine purple-brown colour; the head and thorax are of a yellowish-white, and the body milk-white.

**EPIMETHEA.** Wings tailed, brownish, with a white streak; the lower ones have a fulvous eye on the disk. This is a native of Guinea.

**ANGUS.** Wings tailed, of a pale ferruginous colour, with numerous transparent ocellar dots; the tail is very long. Found in Africa.

**FENESTRA.** Both surfaces of the wings alike, yellow, with two transparent spots on the upper pair, and one on the lower. This and the next are natives of India.

**PENELOPE.** Wings yellowish, speckled with brown; they have a transparent central eye on each.

**TYRRHEA.** Wings grey, with white streaks, and a central black eye; the pupil is transparent. It inhabits the Cape of Good Hope.

**PERSPICUA.** Wings brown; upper pair with a short transparent band. A native of India.

**ARMIDA.** Wings yellow, with violet specks, specks and streak behind. Found at Cayenne.

**MILITARIS.** Both surfaces of the wings alike; yellow, with violet tip and spots; the upper pair is spotted outwardly with white. Found in China, and other parts of Asia.

**CASTALIA.** Wings rounded, white; upper pair with an eye; lower ones with a brown dot. This inhabits New Holland.

\* **PAVONIA.** Wings rounded, and clouded with grey,

and barred with grey beneath; each of them has a nictitant femitransparent eye. In some books this is called the *P. junonia*: it is found in various parts of Europe; it measures nearly six inches in extent of wings, and is varied by a most beautiful assortment of colours, consisting of different shades of deep and light grey, black, brown, &c.; on the middle of each wing is an eye-shaped spot, having the disk black, shaded on one side with blue; surrounded with red-brown, and the whole included by a circle of black: lastly, all the wings are bordered by a deep edging of very pale brown, with a whiter line immediately adjoining to the darker part of the wing; the antennæ are finely pectinated; the larva, which feeds on the apple, pear, &c. is not much less beautiful than the perfect insect; it is of a fine yellowish-green colour, with each segment of the body ornamented by a row of upright prominences of a bright blue colour, with black radiated edges, and surrounded by long black filaments, each of which terminates in a clavated tip. This larva, when ready for its change, envelops itself in an oval web, with a pointed extremity, and transforms itself into a large short chrysalis, out of which, in due time, emerges the moth. This is finely figured in Dr. Shaw's General Zoology, vol. vi.

**ACHELOUS.** Wings ferruginous; all of them with a white band, and the upper pair with a white dot. A native of America.

**ARGULATA.** Wings scalloped, indented; the lower ones are truncated, and very obtuse. A native of Surinam, as is the next also.

**LIBERIA.** Upper wings cinereous or reddish, with dark spots and streaks, lower ones fulvous, with a black eye.

\* **TAU.** Wings of a brick colour, adorned with an eye of a violet colour, having a white spear-shaped pupil. It is found in many parts of Europe, as well as in this country. It feeds on the birch. The larva is green, marked on the sides with oblique white streaks; the back is covered with knots. The pupa is light brown and hairy.

**JO.** Wings yellow; upper pair with a black eye beneath; lower ones with one above; the pupil is white. It is a native of America.

**ABAS.** Wings brown; lower ones cinereous, with a rufous eye. This and the next are natives of Surinam.

**SALMONEA.** Upper wings brown, with a black streak; lower ones rufous, with a black eye, in which is a white lunule.

**PROSERPINA.** Wings rounded, black, with a white band, in which is a subocellar black spot. A native of America.

### b. *Wings reversed.*

**POPULIFOLIA.** Wings testaceous, indented, with numerous brown lunules. It is a native of Europe, and found on the white poplar.

\* **QUERCIFOLIA.** Wings indented, ferruginous; mouth and shanks black. This is found in our own country on grass, the slow, the pear, apple, and willow trees. The larva is hairy, of a rusty colour, with a blue neck, and furnished with a slight tail. The pupa is brown, and marked with red bands.

\* **ILICIFOLIA.** Wings half covered, ferrate, grey; the hind margin is dotted with white.

**PROMULA.** Wings slightly indented, brown, immaculate; abdomen chestnut-brown. It inhabits Java.

**CASSANDRA.** Wings ferruginous, with darker streaks; thorax chestnut-brown on the fore part.

**CAPENSIS.** Wings pale red; upper pair with two flexuous

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flexuous streaks, the posterior of which is joined to a black one. It inhabits Africa.

**ORIENTALIS.** Wings testaceous, with three ferruginous streaks, beneath a single one. This is an East Indian insect.

**ALUCO.** Wings brown, cinereous at the tip. It inhabits the Cape of Good Hope.

**AUSTRALASIE.** Wings orange-red; lower ones beneath ferruginous at the base. This is a native of New Holland.

**QUADRICINCTA.** Wings chestnut-brown, with four pale streaks. It inhabits the East Indies.

\* **FAGI.** Wings reddish-cinereous, with two linear, flexuous, yellow bands.

\* **TRIFOLI.** Wings ferruginous; upper pair with a pale streak and white dot; the lower ones are immaculate.

\* **QUERCUS.** Wings dark brown, with a yellow band; the upper pair with a central white dot. This is figured and described by Mr. Donovan.

**STIGMA.** Wings testaceous, speckled with brown, and with a central snowy dot. Found in America.

**LUSCA.** Wings ferruginous; upper pair with a black spot in the middle. A native of Coromandel.

\* **PRUNI.** Wings indented, yellow, with two brown streaks, and a white dot. This is found on the plum. The larva is smooth, and of an ash-colour; it is marked with blue lines, and furnished with tufts of hair on the neck, and along the sides; the hind legs are stretched out at a distance from one another. The pupa is black on the fore part of the body, and of a light brown behind.

**AMPHIMONE.** Wings entire, pale ash, with a black streak; the upper pair with a fulvous dot in the middle. It is a native of Terra del Fuego.

\* **POTATORIA.** Wings slightly indented, yellow-brown, with an oblique fulvous line, and two white dots, in the upper pair. The larva is tailed, crested, hairy, dark brown, speckled with white; the pupa is folliculate, dark brown; the eggs are oblong, and of a lead colour, with a green ring at each end, and a dot in the middle.

**OCULATISSIMA.** Wings white, with numerous black ocellar dots. This and the next two are natives of America.

**PUNCTATISSIMA.** Wings and body snowy, dotted with white; thorax with a black lunule on each side.

**PITHECIUM.** Wings clouded with brown, a palmate spot on the disk, acute-angled at the base.

**HIBISCI.** Both surfaces of the wings alike, yellow, with two brown streaks on the upper, and one on the lower pair. A native of India.

**CYNORA.** Wings yellow, with two brown streaks, and three connected brown rings on the upper pair. Found in Surinam.

**OPERCULARIS.** Wings yellow; the anterior margin and disk brown, with numerous whitish lines. This and the next are natives of America.

**PYXIDEFERA.** Wings yellow; the disk with numerous brown and black flexuous patches.

\* **PINI.** Wings grey, speckled with brown, with a ferruginous band and base, and triangular white dot. This is figured and described by Mr. Donovan.

**VELLEDA.** Wings black, with white nerves; the margin with four white streaks.

\* **DUMETI.** Wings brown; upper pair with a yellow dot, band, and hind margin.

\* **VERSICOLORA.** Upper wings grey, varied with brown and transverse black and white lines; the lower ones are ferruginous.

\* **RUBI.** Wings fawn-coloured, marked with two whitish streaks on their upper surface. It is found on the

bramble and willow. The larva is hairy, black on the under side, and of a rusty colour, marked with black rings on the upper side. When young, it is covered with a veil of black silk. The pupa is blackish, marked with three yellow rings, and enclosed in a covering of silk.

**LANIGERA.** Wings black, with two whitish streaks, and a snowy lunule in the middle.

\* **VINULA.** Wings grey, with blackish waves and streaks; thorax and abdomen grey, spotted with brown. This is a remarkably elegant insect, without any gaiety of colour, being a middle-sized white moth, variegated with numerous small black streaks and specks; the thorax and abdomen are extremely downy, and the body is marked with transverse black bars. The larva of this moth is far more brilliant in its appearance than the imago or complete insect; it is of considerable size, measuring above two inches in length, and is of a most beautiful green, with the back of a dull purple, freckled with very numerous deeper streaks in a longitudinal direction; the purple part of the back is separated from the green on the sides by a pair of milk-white stripes, which, commencing from the head, run upwards to the top of the back, that part being elevated considerably above the rest into a pointed process; and from thence are continued along the sides to the tail; the face is flat, and subtriangular, yellowish, surrounded, first by a black, and then by a red border; and it is distinguished by two deep black eyes or spots on each side the upper part: from the tail, which is extended into two long, roughened, sharp-pointed, tubular processes, proceed, on the least irritation, two long, red, flexible tentacula, the insect seeming to exert them as if for the purpose of terrifying its disturbers; lifting up the fore-part of the body, at the same time, in a menacing attitude, and presenting a highly grotesque appearance. This creature possesses the power of suddenly ejecting from its mouth, to a considerable distance, an acrimonious reddish fluid, which it uses as a farther defence, and which produces considerable irritation, if it happen to be thrown into the eyes of the spectator. It is principally seen on willows and poplars, and when the time of its change comes, it descends to the lower part of the tree, and envelops itself in a glutinous case, prepared by moistening with its saliva the woody fibres of the tree, and covering itself with them, attaching the edges very closely to the bark, and in this state it remains secure throughout the whole winter, it being too close to be affected by the frost, and too strong to be successfully attacked by birds. The chrysalis is thick, short, and black, and in the month of May or June, according to the warmth of the season, gives birth to the moth, which, immediately on emerging from the upper part of the chrysalis, discharges a quantity of fluid sufficient to soften effectually the walls of its prison, and effect a ready escape.

\* **LANESTRIS.** Wings of a rusty colour, marked with a white streak; the upper wings are white at the base, and marked with a white dot. It is a native of this and other countries of Europe, and found on the lime-tree, the sloe, and the willow. It produces eggs covered with ash-coloured wool. The larva is hairy and black. It is gregarious, and lives in habitations which it forms for itself, composed of many cells; going out in quest of food, it returns through parallel holes. The pupa is of a sulphur colour.

**RUBICUNDA.** Upper wings rosy, with a broad yellow band. It is a native of Virginia.

\* **POPULI.** Brown, the fore part pale; wings brownish, with a flexuous whitish streak, and contiguous smaller one.

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**CATAX.** Wings ferruginous, uniform, with a white dot. Native of Europe.

**EVERIA.** Wings yellow, with a white dot, and paler at the tip. It inhabits Germany.

\* **PROCESSIONEA.** Wings cinereous-brown, with a single darker streak on the female, and two on the male. The larva is gregarious and hairy; and the skin, which it casts off, is said to produce inflammation, if touched.

**PITHYOCAMPA.** Wings grey, with three darker streaks; the lower ones are pale, with a brown dot near the tail. It is found in Austria, and so is the next.

**VARIA.** Wings brown, with waved paler streaks.

**MORI; Silk-worm.** Wings pale, with three obsolete brown streaks. This is by far the most important of all the moths. It is a native of China or Persia, and was introduced into Europe by Justinian. It varies a little in size and colour, the wings being sometimes yellowish, and sometimes whitish. The larva is furnished with a tail, is naked, and whitish. The pupa is light brown, enclosed in a thick silky covering, from which silk is manufactured. The first person who unravelled the cocoons of the silk-worm, and manufactured them into silk, was Pamphilia, a woman of Coos, the daughter of Latona. See *SILK and SILK-Worm.*

**TRICOLOR.** Upper wings snowy, with a scarlet rib, and a streak of black dots; the lower ones are scarlet; thorax snowy, with red dots. It is a native of Cayenne.

**FERRUGINEA.** Wings ferruginous, immaculate. It is a native of Italy.

\* **NEUSTRIA.** Wings pale buff-colour, with two ferruginous streaks, and only one beneath.

\* **CASTRENSIS.** Wings dusky, with two paler bands.

**AMERICANA.** Wings whitish, with patches of brown. A native of North America.

**FRANCONIA.** Wings hyaline, whitish, with a pale streak and black border. It is a native of Austria, as is the next.

**TARAXACI.** Wings pale, both surfaces alike; upper pair with a brown dot in the middle; the body is fulvous.

**ILICIS.** Wings dull grey, with a white band, in which is a waved grey streak. It is found in the oak, in divers parts of France.

**MALI.** Wings cinereous, with a sinuate darker band, in which is a black dot. A native of Germany.

**HIERACII.** Wings entire, footy black. It is found in some parts of Europe, on the *Delphinium hieracium*. The larva is hairy, black, with a red dorsal line, and secretes itself within a follicle, which it makes of dry leaves and straws.

**APIFORMIS.** Wings footy black; body covered with ferruginous hairs. It is a small insect, and found in Italy.

### c. *Wings deflected.*

**LAGOPUS.** Wings yellowish, with brown specks and two streaks; the fore legs are projecting, and very hairy. It is a native of China.

**IMPERATORIA.** Wings yellow, spotted with brown, all of them with a subocellar ferruginous spot. It is a native of India.

**SENATORIA.** Wings brown, testaceous, with a brown streak; the upper pair with a central snowy dot. This and the next are natives of America.

**PELLUCIDA.** Wings brown, testaceous, with a purple outer margin; upper pair with a central snowy dot.

**CRASSICORNIS.** Wings cinereous, with brown specks

and waved streaks. It is a large insect, and a native of India.

**HYPHINOE.** Wings blue; upper pair spotted with yellow. This and the next are natives of Amboina.

**CYANE.** Wings black, with hyaline spots; lower ones with fulvous lunules.

**REGALIS.** Wings grey-brown, with fulvous veins and yellow spots. It inhabits North America.

\* **DISPAR.** Upper wings of the male brown, with black flexuous bands; of the female whitish, with transverse flexuous brown lines. The larva is hairy, with white lines and blue spots on the fore part, and red ones behind. When handled, it causes an unpleasant itching on the skin. The pupa is folliculate, with four black dots.

**LANTANÆ.** Wings snowy, with three or four streaks of connected brown rings. It is a native of America.

**AMASIS.** Wings whitish, with black streaks; lower ones yellow, spotted with black; the abdomen is black, with red belts. It inhabits Surinam.

\* **PUDIENDA.** Wings cinereous, with three waved brown streaks.

\* **FASCELLINA.** Wings cinereous, with black specks and two fulvous streaks.

**LEUCOPHÆA.** Wings brown, upper pair with a broad whitish streak, a black line at the base, and a white dot at the hind angle. This and the next are natives of America.

**LEUCOSTIGMA.** Wings grey, upper pair with black streaks and lines, and a white lunule at the hind angle. The female is apterous.

\* **BUCEPHALA.** Wings grey, with two double brown flexuous streaks, and a large yellow spot at the tip.

**HELOPS.** Wings clouded; lower ones pale chestnut; abdomen chestnut-brown, annulate with white. A native of America.

**OLEAGINA.** Wings slightly tailed, green-brown, with two white spots, the anterior pupillate, the hind one larger. Found in Germany.

**CERULOCEPHALA.** Wings brown, marbled with blueish, and a double irregular whitish spot.

**ARGENTINA.** The wings of this species are toothed on the back, grey, with two silvery spots, the anterior heart-shaped. Native of Germany.

**DECORA.** Upper wings variegated with red, yellow, and black; the lower ones red, edged with black. It inhabits the Cape of Good Hope.

**CELSIA.** Wings above green, with a sinuate indented glaucous band. A native of Sweden.

**DIONE.** Wings white, striate, and dotted with black; beneath there is a purple margin. A native of North America.

\* **ZICZAC.** Wings toothed on the back, clouded brown and reddish-white, with a large clouded ocellar spot at the tip; the antennæ are scaly. Larva solitary, naked, pale rosy, with white lateral lines, and two gibbosities on the back; the tail is red; pupa folliculate, dark brown.

**TRITOPHUS.** Wings toothed on the back, clouded with brown; in the middle is a ferruginous lunule, surrounded with white. It is found in several parts of Austria.

**ELEGANS.** Wings glaucous, with two black streaks and spot in the middle, in the latter of which is a ferruginous lunule. It is found at the Cape of Good Hope.

**CAMELUS.** Wings yellowish, with two red streaks, and a line in the middle. It is a native of India.

**DICTÆA.** Wings appearing as if parched with a whitish stripe; the lower ones whitish.

**GNOMA.** The wings of this species are slightly indented, grty-

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grey-white, with a marginal black band, in which is a white spot. Found at Hamburg.

**DROMEDIARIUS.** Upper wings toothed on the back, clouded, with a yellowish patch at the base, and near the tail.

**ANGNINA.** Upper wings clouded, with transverse pale streak and base, the tip with two black dots in a subocellar whitish spot. This and the three next inhabit America.

**CONCINNA.** Upper wings clouded, with a blackish patch at the base and angles, marginal streaks and dots on the disk.

**UNICORNIS.** Upper wings clouded with green and brown, the tip yellowish, with a blackish patch on the disk, and marginal dots and streaks.

**AURORA.** Upper wings yellow, the base and margin speckled with red.

\* **CORYLI.** Wings glaucous, with a ferruginous band, in which is a black dot, annulate with white; thorax variegated.

**NUDA.** Upper wings naked, hyaline; lower ones cinereous, with a marginal naked spot. It is found in India.

**MORIO.** Wings black, hyaline; abdomen villous, black; the segments are edged with yellow. It is found in different parts of Europe, on the *Lolium perenne*.

**RUBEA.** Wings hyaline, pale reddish, with a pale dot in the middle. Found in Austria.

**ALPHÆA.** Wings ferruginous, with a white dot in the middle, and punctured brown streak. It inhabits New Holland.

\* **MONACHIA.** Wings white, waved with black, marked with blood coloured rings between the segments of the abdomen. It is found on the bramble, the willow, the apple, the oak, and different species of the pine.

**FLAVA.** Wings deep yellow, with three black dots at the tip. It is found in India.

**LUTEA.** Wings deep yellow, immaculate. A native of New Holland.

**EPHIPPIGEA.** Wings yellow, with a common brown dorsal streak. Found in the South American islands.

\* **CORTULA.** Wings glaucous, with white streaks, and a testaceous immaculate spot at the tip.

**RECLUSA.** Wings grey, with whitish streaks; the tip with a ferruginous spot, in which is a marginal white dot. It is found in Germany.

**ANCHORETA.** Wings grey, with white streaks, the tip with a brown ferruginous spot, in which is a waved white streak. A native of Austria.

\* **ANASTOMOSIS.** Wings grey, with three whitish lines, which nearly meet below, the tip is marked with a reddish spot.

**CIPPUS.** Wings brown, with three green spots. Found in Surinam.

**REFLEXA.** Wings varied with cinereous and brown; the feelers are reflected, and as long as the thorax. It is found in the South American islands.

\* **PALPINA.** Wings toothed, whitish, with black veins; feelers projecting, feathered.

\* **TREPIDA.** Wings one-toothed on the back, with an ocellar dot in the middle, and macular brown streaks behind.

**QUERNA.** Wings grey, with three black streaks connected to as many white ones. This is a native of Austria.

\* **CAPUZINA.** Wings indented, ferruginous, with a reflected tooth on the back.

\* **CAMELINA.** Wings indented, ferruginous, with two oblique yellow lines; they have all a small tooth on the back.

\* **AULICA.** Upper wings grey, dotted with yellow; lower ones fulvous, spotted with black.

**HELVOLA.** Wings pale orange, with regular cinereous spots, and a streak behind.

**UNDATA.** Wings cinereous, with two brown bands, including a few cinereous streaks. It is a native of Germany.

**AERIA.** Wings snowy, with black dots; those near the rib are larger; the legs are annulate. It inhabits Carolina.

\* **ERMINEA.** Wings white, with scattered black dots; the abdomen is marked with five rows of black dots. The thighs of this insect are covered with ferruginous wool.

\* **LUBRICIPERDA.** Wings pale orange, with black dots, generally placed in an oblique transverse row.

\* **MENDICA.** Wings of the male brown, obscure; of the female white, pellucid, both dotted with black.

\* **PAPYRATIA.** Wings snowy, with black dots at the tip; the abdomen has five rows of black dots.

**ADVENA.** Wings brown, with white costal dots; the lower ones black, with a fulvous spot in the middle, in which is a black dot. This is a native of Spain.

**RUTILA.** Wings pale yellow, with a ferruginous hind margin. It inhabits Siam.

**LACTIFERA.** Wings black, yellow at the angle of the tail; abdomen above yellow, with a dorsal line of black dots.

\* **LEPORINA.** Wings white, with branched black dots; abdomen immaculate.

**LOTA.** Wings cinereous, with a black dot on the disk, and a purplish broken streak behind.

**STRIGOSA.** Wings brown, with yellow streaks; lower ones black, with an angular submarginal yellow streak. It inhabits Lapland.

**LETA.** Upper wings snowy, with a broad black band; the antennæ are simple. It is a native of Sweden.

**COMMUNIMACULA.** Wings pale flesh-colour, with a common dorsal brown spot. Found in the southern parts of Europe.

\* **COMPRESSA.** Wings compressed, snowy, with a common brown spot; grey in the middle, with a white lunule.

**MILHAUSERI.** Wings hoary, with two dorsal brown spots; antennæ fetaceous. It is a native of Dresden.

**SPRETA.** Wings varied with flesh colour and yellow, and white stigmata. It is a native of Germany.

**LINEUS.** Wings black; upper pair fulvous at the tip, lower ones at the base. This is found at Surinam.

**ULMI.** Upper wings grey, striate, with white at the tip. This inhabits Germany, and is found on the elm.

**BEGGA.** Wings white, with a black rib. Found at Surinam.

**OBSOLETA.** Wings yellowish, with a darker spot in the middle and obsolete streak behind. It inhabits South America.

**LEPIDA.** Wings brown, upper pair with a broad green base. This is a native of Tranquebar.

**EQUESTRIS.** Wings brown; upper pair with a green band in the middle; the lower ones yellowish. It inhabits India.

**GRATA.** Wings snowy, the ribs at the base and hind margin brown. This is found in Georgia, in America.

**V. NICRUM.** The wings of this insect are white, marked with a black *v*. It is found in divers parts of Germany.

\* **CHRYSORRHÆA.** Wings snowy; tail bearded, ferruginous. It inhabits this and other countries of Europe. The larva of this insect is gregarious, hairy, blackish, with two red lines down the back; the eggs are covered with a thick fulvous wool.

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**AURIFLUA.** Wings white, upper pair with a brown rib beneath; the tail is bearded with yellow.

**BICOLORA.** Wings white, with a large yellow spot marked with black. It inhabits Saxony.

\* **SALICIS.** Wings white; legs black, annulate with white. The larva is very beautiful, being hairy, with white dots down the back, on the sides of which are red dots.

**CASSINIA.** Wings grey, with abbreviated scattered black lines. Native of Austria.

**CENTROLENEA.** Wings clouded with cinereous and brown, with a central white line edged with a black one. It is a native of Austria.

**TESSELLARIS.** Yellowish; wings abbreviated, with numerous tessellate deeper bands on the upper pair. This is an American insect.

\* **CRATÆGI.** Wings rounded, dark cinereous, with a darker band; tail bearded.

**ERIDANUS.** Body and wings snowy; abdomen with fulvous rings. It is a native of Surinam.

**TIBIALIS.** Wings snowy; fore-thanks yellowish, dotted with black. It inhabits New Holland.

**NITIDULA.** Wings snowy; upper pair with two costal, shining, glaucous spots, and a marginal band of the same colour. It is found in Coromandel.

**INNOCUA.** Wings white; upper pair with four abbreviated black streaks, the hind margin is yellow. It inhabits South America.

**JILIBATA.** Wings white; abdomen and fore thighs red above. This inhabits the American islands.

**REPANDA.** Wings pale, with three white streaks, and a pale ferruginous hind margin. This and the next inhabit the South American islands.

**EXIGUA.** Wings yellowish, with ferruginous bands.

**PLUMIGERA.** Wings subferruginous, with a yellowish streak; antennæ of the male pectinate. Found in Austria.

**OBSOLETA.** Wings whitish, with a ferruginous rib; the feelers are ferruginous. It is found in New Holland. Sir Joseph Banks has a specimen of this insect, and also of the next.

**CORONES.** Upper wings cinereous; the lower ones are snowy. It inhabits New Holland.

**FESTIVA.** Wings yellowish, spotted with blue at the base, and dotted with black at the tip. It is found in America.

**DRYAS.** Wings brown; abdomen fulvous, with black dots; the tail is black. It inhabits Surinam.

**RAMOSA.** Wings yellow, with black branched lines and marginal dots. It is found in Italy.

\* **RUSSULA.** Wings yellow, with a red margin and brown spot; the antennæ are red. This is described and figured by Mr. Donovan, and so is the next.

\* **JACOBÆA.** Wings brown, with a red line and two dots; the lower ones are red, edged with black.

\* **GRAMMICA.** Wings yellow; the upper ones are of a deeper, striate with black; the lower ones are marked with a black terminal band.

**PENNATULA.** Wings cinereous on the outer part and chestnut-brown within, a paler stripe dividing the colours. It is a native of the East Indies, as is the next.

**LINEOLA.** Wings white; upper pair with a black line; lower ones with a black dot on the disk.

\* **PURPUREA.** Upper wings yellow, dotted with brown; lower ones red, spotted with black.

\* **PLANTAGINIS.** Wings black, with yellow rivulets; lower ones yellow, with black margin and spots.

**VITTATA.** Wings black, with three abbreviated white fillets. This is a native of America.

**LUGUBRIS.** Wings yellow, with black rivulets and dots; lower ones brown.

**HELIOPHILA.** Wings varied with brown and cinereous; lower ones snowy, edged with black. This is found in Lapland.

**PARTHENIAS.** Upper wings brown, with greyish speckled bars; lower ones orange, with a triangular black spot at the inner margin and small line. This is an European insect.

\* **MATRONELA.** Upper wings brown, spotted with yellow; lower ones yellow, with black bands.

\* **VILLICA.** Wings black, with eight cream-coloured spots; the lower ones are fulvous, spotted with black.

**HEBE.** Wings black, with white bands; lower ones red, spotted with black. It inhabits Europe.

**TARQUINIUS.** Wings cinereous, with a black spot in the middle, in which is a branched line. Found at Surinam, as is the next.

**TARQUINIA.** Upper wings black, with a hooked white line between two white streaks.

\* **CAJA;** or Great Tyger Moth. Upper wings whitish, with irregular blackish spots; lower ones orange, spotted with black. This species is one of the larger English moths. The larva is of a deep brown, with white specks; extremely hairy, and feeds on plants. It changes into a chrysalis in June, and the fly appears in July.

**PUDICA.** Wings white; upper pair spotted with brown; lower ones immaculate. It inhabits the south of France.

**CASTA.** Wings black, with two indented white bands; the lower ones are red, with marginal brown spots. It inhabits Germany.

**MACULOSA.** Wings spotted with black; upper pair brown; lower ones red. It is a native of France.

**VIRGO.** Wings black, with reddish rivulets; lower ones red, dotted with black. It is a native of America.

**PHYLLINA.** Wings black, with reddish rivulets; lower ones red, spotted with black, and a marginal black line. A native of America, as are the five that follow.

**PLACENTIA.** Wings black, with three white spots; lower ones red, with black spots and margin.

**ISABELLA.** Wings dotted with black; upper pair fulvous, lower ones rosy.

**ECHO.** Wings snowy, with black marginal nerves on each side, the back is spotted with yellow and black.

**MENETE.** Wings black, with white spots; lower ones purple, with a black central spot and margin.

**DEFLORATA.** Wings white, spotted with black; lower ones beneath black, with white bands.

**HYALINA.** Wings hyaline, cinereous; tail black, bearded. It inhabits Italy.

**ALBIFRONS.** Wings grey; upper pair with a marginal angular snowy streak, surrounded with black specks. This and the three following are natives of America.

**MINISTRA.** Wings ferruginous; upper pair with five transverse brown lines on the disk and margin.

**GIBBOSA.** Wings testaceous; the upper pair are marked with a double transverse yellowish streak, and intermediate double white dot.

**ANGULOSA.** Wings grey; the upper pair have black flexuous lines and blotches, and a projecting tooth on the back.

### d. *Wings recumbent.*

**CROTOLARIAS.** Upper wings purple, with ocellar black spots; lower ones red, spotted with black. This and the two next are natives of India.

**RICINI.** Wings dusky, with numerous subocellar brown spots;

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spots; the lower ones are red, spotted with black. It is found on the ricinus.

**SANGUINOLENTA.** Wings snowy; upper pair with a sanguineous rib, lower ones with black spots.

**PUELLA.** Wings brown; thorax dotted with black; tail and legs red. It inhabits Guinea.

**SERVA.** Wings grey, mixed with cinereous and brown: the abdomen is red above

**HENA.** Wings greenish-black, with yellow rivulets; the lower ones are reddish, with three black spots.

\* **DOMINULA.** Wings glossy-black, with white and reddish spots; the lower ones are of a dull red, with black spots. A native of Europe.

**CREDULA.** Wings and body black, dotted with white. Native of America.

**LECTRIX.** Wings black, with blue, yellow, and white spots; the lower ones are red, spotted with white. Found in China.

\* **FURCULA.** Thorax variegated; wings grey, the base and tip white, dotted with black. A native of Europe.

**COLON.** Wings grey-brown, with two black distant dots. Found in Germany.

**POPULETI.** Wings shining-grey, with a streak of black dots behind. Found on the Populus tremula, in divers parts of Germany.

\* **ANTIQUA.** Upper wings dull ferruginous, clouded with brown, a white lunule at the posterior angle; the female is nearly apterous.

\* **GONOSTIGMA.** Wings brown, with two opposite white spots; female apterous.

**PARADOXA.** Wings varied with cinereous and brown, marked with a whitish central spot; the lower ones are black; the female is apterous.

**ZONA.** Wings black, with white bands; the abdomen is black, with the edges of its segments red; the female is apterous. A native of Germany.

**PYLOTIS.** Wings yellow, with six bands of black dots; lower ones dotted with black. Found in New Holland.

**PULCHELLA.** Wings white; the upper pair is dotted with black and red; and the lower ones are tipped with black. Found in the East.

**GRISEA.** The wings of this species are cinereous, waved with brown; and the lower ones are white. Found at Cayenne.

**PRIVERNA.** Upper wings brown, with a yellow band; the lower ones are fulvous, edged with black. It inhabits Surinam.

**FRANCISCA.** Upper wings flesh-colour, with an interrupted white fillet; the lower ones hyaline. It inhabits Coromandel.

**JESUITA.** The wings of this species are black, with a fulvous streak. It is a native of India.

**ANGULATA.** Wings angular, testaceous, with black specks, and two obsolete cinereous streaks. It inhabits India.

**VICIELLA.** Wings cinereous hyaline; the antennæ are brown. The body of this insect is covered with wool. The female deposits her eggs while in the pupa state, and never becomes a perfect insect.

**VESTITA.** Wings black, immaculate; abdomen beneath downy, white. Found in Germany.

**MUSCELLA.** The wings of this are of a dull hyaline colour; the body is black. It inhabits Austria.

**PECTINELLA.** Wings cinereous hyaline; the upper pair are marked with obsolete darker streaks. This and the next are natives of Austria.

**BOMBELLA.** Wings cinereous, speckled with brown.

**MUNDA.** Wings cinereous hyaline, with a brown dot and band. Found on lichens in various parts of Europe.

**INDIANA.** Wings hyaline, with a yellow border dotted with black. It is a native of India.

**ANNULATA.** Wings black, with snowy spots. The franks are annulate with white. It is a native of Germany.

\* **GRAMINIS.** Wings grey, with a whitish line and dot.

**POPULARIS.** The wings of this are brown, with white veins; the lower ones are whitish. Found in Russia and Germany.

**FULMINEA.** The wings are indented, and variegated with grey and brown; the thorax is white on the fore part, with a black streak. It is found on the Achillea millefolium.

**GLORIOSÆ.** The wings of this species are black, variegated with red and yellow; the lower ones are brown, edged with yellow. It is a native of India.

**CRINI.** Wings black, subferruginous before the margin; the lower ones are white.

\* **ROSEA.** The wings of this insect are rosy, with three brown streaks, the second is waved, the third at the tip is composed of dots. The larva of this insect is short and very hairy, with grey tufts; the head is orange; the pupa is inclosed in a thick follicle.

\* **RUBRICOLLIS.** Black, with a red collar; the abdomen is yellow.

**FULIGINOSA.** Wings red-brown, with a double black dot; the abdomen is red, and it is black on the back. The larva of this insect is hairy and ferruginous, with black head and fore-legs; it wanders over the snow in winter, and is said to prognosticate a cold summer, and scarcity where it appears in considerable numbers.

**BINOTATA.** Wings cinereous, with two black dots between two brown waved streaks. It is middle-sized, and inhabits Sweden.

**CRIBRUM.** Upper wings white, transversely dotted with black; the tail is yellowish. Found in the northern parts of Europe.

**OBSCURA.** Both surfaces of the wings alike, brown, with three hyaline dots on the upper pair; the abdomen is yellow, with a black line. It is found on the Lichen parietinus, in Germany.

**PUNCTATA.** In this also both surfaces are alike; the upper pair is brown, dotted with white; the lower ones are tipped with brown. It is an Italian insect.

### e. *Wings convolute.*

**BELLA.** Wings yellow, with six bands of black dots; the lower ones are red, tipped with black. It is a native of North America.

**ORNATRIX.** Wings whitish, the margin red dotted with black; the lower ones are varied with white and black. Found in various parts of America.

**UMBER.** Wings black; front and abdomen fulvous. It inhabits Surinam.

**HISTRIO.** Wings fulvous, with numerous white spots furrounded with blue. It inhabits the South American islands.

### GEOMETRA.

We shall in this and the following sections mention only those that are natives of this country, in order to shorten the article as much as possible, except in those in which there are not a sufficient number of English to illustrate the sections.

## PHALÆNA.

### 2. *Antennæ pectinate.*

\* **LACTARIA.** Wings angular, snowy, immaculate; antennæ bipectinate, setaceous at the tip. Very tender and pellucid.

\* **NIVEARIA.** Wings subangular, white, with a brown hind margin; the under surfaces of the upper pair are brown, the lower ones are marked with a central black dot.

\* **VERNARIA.** Wings angular, greenish, with two white flexuous streaks; the antennæ are setaceous at the tip.

\* **PATATORIA.** Wings angular, whitish, with two full white flexuous streaks; the antennæ are setaceous at the tip.

\* **PUNCTARIA.** Wings angular, cinereous, with a ferruginous streak and row of black dots. The larva of this species is cinereous, with lateral yellow spots and marked with red; the pupa is bound to a leaf, above it is of a pale flesh-colour, and beneath it is yellowish.

\* **AMATORIA.** The wings of this are angular, and buff-coloured speckled with brown, with a straight purple line and obsolete flexuous brown one on each. The larva is green, with yellow belts above, and red ones beneath.

\* **PENNARIA.** Wings slightly indented, reddish, with two brown streaks, and a white dot at the tip.

\* **USTULARIA.** Wings slightly indented, ochraceous, with three brown streaks, and spot at the base and tip.

\* **BIDENTARIA.** Wings jagged, grey, with a deeper coloured band, in the middle of which is an ocellar dot.

\* **FALCATA.** Wings falcate, glaucous; the upper pair is marked with a grey band and waves, in the band is a brown dot.

\* **SAMBUCARIA.** Wings tailed, angular, yellowish, with two darker streaks; the lower ones with two reddish dots at the tip.

\* **LACERTINARIA.** Wings toothed, yellowish, with two brown lines and a dot between them; the lower ones are whitish and immaculate.

\* **ALNIARIA.** Wings angular, toothed, speckled with brown, and crossed with two brown specks.

\* **SYRINGARIA.** Wings angular, indented, grey, with flesh-colour shades, and two brown streaks on the upper pair meeting at the tip.

\* **LUNARIA.** Wings jagged, reddish-brown; all with a white ocellate dot; the upper pair is marked with an incurved brown streak.

\* **DENTARIA.** Wings angular and indented, above pale, with ferruginous streaks; beneath it is ferruginous, with a darker lunule.

\* **DOLABRARIA.** Wings angular, yellow, with a ferruginous streak; the angle of the tail is violet.

\* **SUBERARIA.** Wings yellowish, deeply indented; the upper pair is marked with a brown ferruginous patch, and two black streaks; the lower ones with a brown ferruginous band and single streak.

\* **PAPILIONARIA.** Wings indented, green, with a flexuous white streak, and contiguous smaller one. The larva is green, with ten incurved rufous prickles on the back; the pupa is green varied with yellow.

\* **PRUNARIA.** Wings slightly indented, yellow-orange, speckled with brown; the upper pair with a brown lunule. The larva is ferruginous, with two spines before and behind.

\* **PINIARIA.** Wings spotted with yellow, beneath clouded with two brown bands.

\* **LIMBIARIA.** Wings ferruginous, with a black border; lower ones beneath black streaked with white.

\* **ATOMARIA.** All the wings yellowish, with brown streaks and specks.

\* **PROSAPIARIA.** Wings yellowish, with brown specks, and three brown streaks, the last of which is composed of spots.

\* **PUSARIA.** Wings snowy, with three obsolete brown streaks.

\* **DEPOLIARIA.** Wings grey, speckled with brown, white in the middle, with a brown dot.

\* **HIRTARIA.** Wings hairy, grey, with three black streaks, the hinder ones approximate; antennæ black.

\* **VESPERTARIA.** Wings yellowish, with two brown streaks, the first angular, the posterior one separating the darker border.

\* **WAURIA.** Wings cinereous; upper pair with four short irregular bands, the middle one resembling the letter L.

\* **DITARIA.** Wings green, with ferruginous marginal spots.

\* **VIRIDARIA.** Wings rounded, green, with whitish streaks and a marginal black dot.

\* **PULVERARIA.** All the wings powdered with testaceous, with a broad ferruginous band.

\* **FASCIARIA.** In this species the wings are reddish, with a broad ferruginous band edged with white.

\* **DIVERSARIA.** Upper wings reddish, lower ones whitish; the margin of all dotted with black.

\* **BETULARIA.** All the wings white, speckled, and waved with black; the thorax is marked with a black band; the antennæ are setaceous at the tip.

\* **PRODROMARIA.** Wings white, speckled with black; with two broad dark ferruginous bands.

\* **PLUMBARIA.** Wings plumbeous, with three brown streaks and a dot in the middle.

\* **PURPURARIA.** Wings yellow; the upper pair with a purple margin and two bands.

### b. *Antenna setaceous.*

\* **FALCATA.** Wings falcate, fulvous, with two brown dots between two yellow streaks.

\* **DUBITATA.** Wings indented, waved with brown, grey and black; the nerves are dotted with white.

\* **DIMIDIATA.** Wings indented, yellow before, and brown behind.

\* **VIRIDATA.** Wings angular, all green, with a pale streak.

\* **STRIGATA.** Wings indented, cinereous, with a broad brown band, in which is a waved black streak.

\* **NOTATA.** Wings angular, pale, with three browner streaks; upper pair with four approximate dots.

\* **EMARGINATA.** Wings emarginate, pale, with two grey bands and a brown dot.

\* **GROSSULARIA.** Wings whitish, with round black spots, and two yellow streaks on the upper pair.

\* **UNDULATA.** All the wings with numerous, crowded, undulated streaks.

\* **POPULATA.** Wings pale yellow; upper pair sub-fasciate at the tip, the lower part is darkened with brown.

\* **COMITATA.** Upper wings yellowish, with three grey bands, and a brown dot and line at the tip.

\* **ULMATA.** Wings white, with two ferruginous brown bands, the hindermost composed of spots.

\* **PRUNATA.** Wings grey-brown, with two pale flexuous bands, the posterior one nearly terminal.

\* **CRATÆGATA.** Wings of a deep yellow, with three ferruginous spots on the rib of the upper pair, the middle one somewhat silvery.

\* **FERRUGINATA.** Wings orange, with brown spots, waves

## PHALÆNA.

waves and streaks, and a line of white dots along the anterior margin.

\* **MARGINATA.** All the wings are white, the exterior margin with a brown interrupted border.

\* **MIATA.** Wings grey, with three green bands, the middle one broader, and waved with brown.

\* **DECUSSATA.** Wings cinereous, with four black streaks, the two middle ones flexuous and crossing each other.

\* **ALBICILLATA.** Wings whitish, with a brown margin and spot at the base and tip.

\* **HASTATA.** All the wings white, irregularly barred, and spotted with black.

\* **TRISTATA.** All the wings black, with two white immaculate bands.

\* **CLATHRATA.** All the wings yellowish, with black lines and streaks crossing each other.

\* **CHEROPHYLLATA.** Black; wings erect; upper pair white at the tip.

\* **PROCELLATA.** Upper wings white, with three brown bands, the middle one reaching half way across, the hind one marginal, with a white spot in the middle.

\* **FLUCTUATA.** Wings pale cinereous, with three abbreviated brown bands on the upper pair.

\* **BILINEATA.** Wings yellow, with testaceous waves, and brown flexuous bands and white streaks. The larva is greenish, nearly immaculate, and sometimes with white lines.

\* **VOLUTATA.** All the wings of this insect are green, with two white streaks.

\* **LYNCEATA.** Wings rounded, white, with two brown bands and a dot at the tip.

\* **BRUMATA.** Wings yellowish, with a black streak, and paler behind; the female is apterous and of a brown colour.

\* **CHENIPODIATA.** Upper wings testaceous, with three grey bands, a brown prominent dot and line at the tip above.

\* **HEXAPTERATA.** Upper wings varied with grey and brown; lower ones whitish, with an additional pair of wings at the base.

\* **DAPLICATA.** Upper wings grey, with three brown flexuous bands.

\* **ALCHEMILLATA.** Wings brownish; the upper pair waved, with a snowy band, with cinereous waves, and line within the tip.

\* **SUCCENTURIATA.** Wings whitish, with a darker border, and black dot.

\* **MACULATA.** All the wings yellow, with brown spots.

\* **EUPHORBATA.** All the wings brownish-grey, immaculate.

\* **PUNCTATA.** Wings rounded, snowy; upper pair with a brown dot in the middle, the margin is dotted with black.

\* **MURINATA.** Wings cinereous, with three darker streaks; all with a central black dot.

\* **SOCIATA.** Wings deep yellow, with a brown band, in the middle of which is a recurved tooth.

\* **PURPURATA.** Wings greenish, with two purple bands on the upper pair.

\* **IMMUTATA.** All the wings snowy, with darker waved streaks; the hind margin dotted with black.

\* **CINGULATA.** All the wings are brown, with a snowy streak.

\* **URTICATA.** Wings white, with macular brown bands; the thorax and tail yellow.

\* **LIMEATA.** Wings rounded, yellow, with a brown ocellar dot, and hind margin.

\* **PALUDATA.** Wings white, with a brown band or two, and black ocellar dot in the middle.

\* **STRATIOLATA.** Wings with pale bands; upper pair with three black dots. The larva of this insect is aquatic, six-footed, green, with tufted lateral spiracles; the pupa is folliculate, tapering both ways, and of a ferruginous colour.

\* **NYMPHÆETA.** Wings cinereous, all of them alike, with reticulate white spots.

\* **LEMNATA.** Wings white; lower ones with a terminal black band, in which are four white dots.

### c. *Wings forked.*

\* **FARINALIS.** Feelers recurved; wings polished, yellowish, with white flexuous streaks, the base and tip glaucous. This is found chiefly in bran and meal.

\* **GLAUCINALIS.** Feelers recurved; wings glaucous, with two brown flexuous streaks.

\* **BARBALIS.** Antennæ pectinate, longer than the feelers; fore-thighs with a projecting beard. This is found on the *Trifolium pratense*.

\* **TENTACULARIS.** Antennæ pectinate, as long as the projecting feelers; wings pale cinereous, with brown streaks.

\* **PROBOSCIDALIS.** Feelers projecting, approximate, longer than the thorax; the wings are grey, with ferruginous streaks.

\* **ROSTRALIS.** Feelers projecting, longer than the thorax; wings greyish, with two muriate black dots, and line at the tip. This is found on the *Carpinus* and *Humulus*.

\* **NEMORALIS.** Feelers recurved; wings grey, with three brown streaks, the middle one flexuous.

\* **PALPALIS.** Feelers projecting, longer than the thorax; wings grey; lower ones white, at the thicker margin.

\* **FORFICALIS.** Wings glabrous, pale, with oblique ferruginous streaks.

\* **VERTICALIS.** Wings glabrous, pale, sub-fasciate with brown; beneath it is waved with brown. The larva of this insect is sixteen-footed, hairy, with yellow head and legs; the pupa is of a fine shining black. The three last segments have each a small tooth.

\* **SALICALIS.** Wings cinereous, with three oblique fulvous streaks on the upper pair; antennæ pubescent. The larva is fourteen-footed, naked, green, with a darker dorsal line. The pupa is of a fine shining black.

\* **STICTICALIS.** Wings grey, with a yellow spot in the middle, and a marginal streak. The spot in the middle is notched on each side, and the marginal streak has a contiguous smaller one. Beneath it is variegated.

\* **PURPURALIS.** Wings purplish, with two yellow bands on each.

\* **COSTALIS.** Wings purplish, with two yellow costal spots, and hind margin.

\* **ATRALIS.** Wings black, with two white spots on each.

## NOCTUA.

### a. *Wings expanded.*

\* **ZENOBIÆ.** Wings variegated; beneath ferruginous, with black waves. It inhabits Surinam.

\* **PATROCLUS.** Wings tailed, both surfaces alike, brown, with an oblique linear white band and tip. This is found in India.

\* **CAPRIMULGUS.** Wings indented, brown, with black waves; the upper pair with a blueish eye, and double black pupil. A native of China.

\* **NOCTILIO.** Wings suberous, brownish, with waved black

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black streaks; the lower ones white at the tip, with a black spot. This is a native of the East Indies.

**CREPUSCULA.** Wings brown, with a white band, and marginal spot; the upper pair with an eye. This is a native of America. One sex has a double eye with a pupil, the other a blind eye.

**TROGLODYTA.** Wings brown, with black waves, and a common white streak; on the upper pair is a common shining eye. It is found in Guinea. This is a very curious insect. Upper wings with a large eye dotted with blue, with a large lateral black pupil, blue lunule, and black iris; behind this is a common white streak, and afterwards a streak of small black lunules. Beneath, it is all brown, with a broad white band behind, which are white lunules joined to the band.

### b. *Wings flat, incumbent; thorax smooth.*

**DIOSCOREÆ.** Wings indented, grey; lower ones yellow, with a black lunule and border. It inhabits India.

**PAPHOS.** Upper wings brown, with white veins; the lower ones are varied with white and black. It is a native of Siam, and a specimen is to be found in Sir J. Banks' museum.

**EUGENIA.** Body dotted with black; wings snowy, with a hyaline disk; the abdomen is red on the back part. It is a native of India.

\* **COMPLANA.** Wings with a paler outer margin; lower ones entirely yellow. It is found on the oak. The larva is hairy, and black, with two lines of pale dots.

\* **QUADRA.** Wings yellow, with two blue dots on the upper pair; there is a variety that has cinereous wings, and a yellow thorax.

### c. *Wings flat, incumbent; thorax crested.*

\* **SPONSA.** Upper wings undulate with brown; the lower ones are red, with two black bands; the abdomen is entirely cinereous. The larva is fluted, the head is blueish, and the body variegated.

\* **NUPTA.** Wings cinereous, varied with brown; the lower ones are red, with two black bands; the abdomen is hoary beneath.

\* **PACTA.** Wings greyish, slightly waved; the lower ones are red, with two black bands; the abdomen is red.

\* **FRAXINI.** Wings indented, grey, with waved dark bands; lower ones above black, with a blueish band.

\* **PRONUBA.** Lower wings testaceous, with a black nearly marginal band.

\* **FIMBRIA.** The upper wings clay colour, with a paler tip; lower ones pale orange, with a broad black band. The larva is smooth, brownish, with pale lines, and black stigmata; the pupa is blueish-black.

\* **STRAMINEA.** Wings straw-colour, with a double blackish spot in the middle of the outer margin, and a darker sub-marginal band; the lower ones have a broad brown border.

\* **MAURA.** Wings indented, dark brown, with irregular cinereous marks; beneath a whitish border.

\* **LIBATRIX.** Wings jagged, reddish-grey, with two white dots, and two whitish streaks.

\* **PLECTA.** Wings brown, with a white thicker margin.

\* **BRASSICÆ.** Wings clouded with cinereous, with a black hook at the first spot.

### d. *Wings deflected; thorax smooth.*

**FICUS.** Wings cinereous with white veins, the base spotted with fulvous white and black. It is found in India, on the *Ficus racemosa*.

**ARUNDINIS.** Wings cinereous, with black dots and marginal lunules, beneath it is marked with a central brown spot. It is found in the stalks of the common reed, and is said to occasion the staggers in horses.

**VIRESCENS.** Wings greenish, with three darker streaks. It is found in the pods of the *Cytisus caian*.

\* **BATIS.** Upper wings brown, with five peach-coloured spots; the lower ones are cinereous.

\* **ROBORIS.** Wings cinereous, with two white waved streaks, and a central snowy spot, in which is a black lunule.

\* **TRAPEZINA.** Wings whitish, with a very broad deeper band, in which is a black dot; the margin is dotted with black. The larva is greenish, with cinereous, with white and sulphur-coloured lines; it preys on the larva of other moths, and even on its own species.

\* **CERASI.** Wings grey-ferruginous, with a yellowish spot, and streak behind, the margin is dotted with black.

\* **MONILIS.** Wings chestnut-brown, with four approximate white dots, the antennæ are pectinate.

**GRACILIS.** Wings brown-cinereous, with a brown and waved streak at the base, and a yellowish one at the tip, with a punctured one between them. The larva is naked, greenish, with yellowish sides; the incisures are yellow, each segment with four dusky spots, and a black one before. It is an American insect.

### e. *Wings deflected, thorax crested.*

\* **FULVAGO.** Upper wings yellow, with ferruginous streaks, the hind one composed of dots; the lower wings are white.

\* **CITRAGO.** Wings yellow, with three oblique ferruginous streaks.

\* **CHRYSITIS.** The wings of this insect are yellowish-brown, with two green-gold bands, and a yellowish marginal one.

\* **FESTUCÆ.** Upper wings varied with yellow and brown, with three silvery-gilt spots; the lower ones pale brown.

\* **JOTA.** Upper wings reddish-grey, with a large brown spot in the middle, in which is an inverted gold *i*.

\* **METICULOSA.** Wings indented, pale; the upper pair is of a flesh-colour at the base, with a brown triangle.

\* **GOTHICA.** Upper wings brownish, with a black curve and dot in the middle; the curve is turned upwards.

\* **DORASA.** Upper wings varied with rufous brown and white, with two black ocellar dots in the middle.

\* **SATELLITIA.** Wings indented, reddish-brown, with a yellow spot in the middle, between two smaller white ones.

\* **DIFFINIS.** Wings ferruginous, with three white spots at the rib, and two black dots behind. The larva is green, with white lines, head and fore legs black.

\* **MARGINATA.** Wings yellowish, with ferruginous streaks and hind margin; lower ones with a black central dot and marginal band.

\* **ABSENTIUM.** Wings hoary, with black bands, and dots disposed in a quadrangle.

\* **ALORI.** Wings footy, with two grey patches, the first with a black marginal dot.

\* **DELPHINI.** Wings purplish, with two whitish bands; lower ones dusky.

\* **PERPICILLARIS.** Wings with brown streaks, twice two-toothed behind, with a single kidney-shaped common spot.

\* **PII.** Wings purplish, with two darker spots, and a yellowish waved streak at the tip.

\* **OXYACANTHÆ.** The colour of the wings is dark brown,

## PHALÆNA.

brown, with two flesh-coloured spots and tip, the inner margin greenish, with a white lunule.

\* *CHRYSOCERAS*. Upper wings olive-green, with sulphur-coloured streaks and hind margin; lower ones brownish, with a sulphur margin.

\* *GEMINA*. The upper wings are of a brownish-grey, with two streaked darker bands, and two intermediate snowy dots.

\* *PULLA*. Upper wings brown, ferruginous, slightly clouded, with a white undulate streak.

\* *CHRYSOGLOSSA*. Upper wings subfalcate, grey, with three streaks, the two first are abbreviated.

\* *ATRIPLICIS*. Upper wings brown, with blue and yellow streaks; in the middle is a white mark, and a bifid yellow one.

\* *PRÆCOX*. Wings cinereous, with two subocellar spots; the lower ones are of a reddish-brown, with an abbreviated rufous band. There is a variety which has its wings entirely greenish.

\* *PYRAMIDEA*. Wings brown, with three flexuous, waved, yellowish streaks; the lower ones are ferruginous.

\* *LUCIFARA*. Wings cinereous, with dark angular marks, and a broad brown band in the middle.

\* *OLERACEA*. Upper wings ferruginous, with a yellowish lunule and white streak, two-toothed behind.

\* *XANTOGRAPHIA*. Wings black; lower ones snowy at the base.

\* *PINASTRI*. Wings black, the thinner margin and angle of the tail dull cinereous.

\* *APRILINA*. Upper wings greenish, with black spots, and triangular dot each side behind.

\* *LUDIFICA*. Upper wings and abdomen yellow, the latter with three rows of black dots. It is found on the willow.

\* *LICHENES*. Upper wings green, with various black marks; the lower ones and all beneath brown.

\* *PSI*. Upper wings grey, with a black line at the base, and various marks resembling the Greek  $\psi$ ; the legs are immaculate.

\* *COMMA*. Wings indented, cinereous, with a black line at the base, and an adjacent thinner white one.

\* *CHI*. Wings grey; upper pair marked with a black Greek  $\chi$ .

\* *ACERIS*. Wings grey, with black waves; abdomen pale ferruginous at the base beneath.

\* *LITURA*. Wings grey, with a black patch in the middle, in which is a white dot.

\* *PERSICARIÆ*. Wings clouded with brown, with a white kidney-shaped spot, in which is a yellow lunar pupil.

\* *TRAGOPOGINIS*. Upper wings brown, with three black approximate dots in the middle; the lower ones livid.

\* *TRIPLACIA*. Upper wings with a double curve, turning contrary ways, and three glaucous spots between them.

\* *RUMICIS*. Wings grey, with brown streaks and clouds, and an ocellar spot in the middle.

\* *EXOLETA*. Wings lanceolate, convolute, clouded with brown and cinereous, with four white marginal dots.

\* *VERBASCI*. Wings scalloped, indented, pale yellow, with brown margins.

\* *UMBRATICA*. Wings striate, lanceolate, grey, with a ferruginous spot in the centre, in which are two black dots.

\* *PUTRIS*. Wings subpunctured, the outer margin is brown, with an adjoining subocellar spot.

\* *MYRTILLI*. Wings ferruginous, spotted with white;

lower ones yellow, with a black border. The larva is naked, green, with five rows of blackish tubercles: the pupa is chocolate brown, with white stigmata.

\* *ARBUTI*. Wings brown; lower ones black, with a yellow band.

### HYBLÆA.

\* *LAGOPUS*. Wings deflected, cinereous at the base, and tip with brown; the legs are very hairy. The insects of this division are all natives of the East Indies.

\* *ROSTRATA*. Wings deflected, brown, with a common cinereous spot in the middle, and one at the rib.

\* *DEFLORATA*. Wings incumbent, grey; lower ones yellow, with a black fillet and marginal band.

\* *SAGA*. Wings incumbent, glossy brown; the lower ones are black, with two fulvous spots.

### HEPIALUS.

\* *HUMULI*. Wings of the male snowy, striate, of the female yellow, with fulvous marks.

\* *HECTA*. Wings deflected, yellow, with two oblique whitish bands, consisting of interrupted dots.

### COSSUS.

\* *COSSUS*. Upper wings grey, with numerous short curves, and black streaks; the thorax with a black band.

\* *ÆSCULI*. Wings white, with numerous dark blue spots; the thorax has six. The antennæ of the male are feathered at the base, and setaceous at the tip; of the female setaceous.

### PYRALIS.

\* *BANKIANA*. Wings brown, with two snowy bands; the hinder is one-toothed. It is found in the woods.

\* *LECANA*. Wings pale, with a brown central spot.

\* *PRASINANA*. Upper wings green, with two oblique yellowish streaks; the lower ones are white.

\* *FAGANA*. Upper wings green, with three oblique white streaks; the lower ones are whitish-green.

\* *VIRIDANA*. Wings rhombic; upper pair green, immaculate; lower ones brown. The larva is naked and sixteen-footed, green dotted with black, the head is red; and the hind legs are yellow.

\* *CILORÆNA*. Wings rhombic; upper pair green, with a white margin. The larva is green, dotted with white; the sides spotted with brown.

\* *UNCANA*. Wings brown, with a whitish outer margin sending out a recurved branch in the middle.

\* *ROSANA*. Upper wings testaceous, with an oblique grey band.

\* *CHRISTIERNANA*. Wings yellow, with red bands, crossing each other in the middle.

\* *SMEATHMANNIANA*. Wings whitish, with two oblique brown bands, the first abbreviated, the other interrupted.

\* *FUSCANA*. Upper wings brown, immaculate.

\* *FOSTERANA*. Upper wings dull cinereous, with two brown marginal spots.

\* *XYLOSTEANA*. Upper wings testaceous, with an oblique brown band.

\* *MINISTRANA*. Upper wings testaceous, with a rufous hind margin; in the middle is a ferruginous mark, with a white line.

\* *CRYSTALANA*. Upper wings yellow brown, with dark shades; there is a broad irregular white mark, and a tuft in the centre.

\* *UDMANIANA*. Wings dark grey, with an angular common chestnut-brown mark. The larva is rosy, with white

## PHALÆNA.

white lateral spots, and black head and collar; pupa reddish-brown.

\* *SOLANDRANA*. Wings pale, subfasciate with white, with a dorsal ferruginous spot.

\* *PUPILLANA*. Wings pale, with two oblique brown bands; the angle of the tail is marked with a blackish spot, in which are three silvery dots.

\* *ZOEGANA*. Wings yellow, with a brown central dot; the tip is brown, and marked with a yellow spot.

\* *HAMANA*. The upper wings of this species are yellow, with a reddish-brown dot, and hooked mark behind.

\* *OBLIQUANA*. Wings cinereous, with oblique fulvous bands edged with white.

\* *BRYNNICIANA*. Wings brown, with a common brown rhombic dorsal spot.

\* *PRUNIELLA*. Wings purplish-brown, with a white stripe down the middle, in which is a black dot.

\* *ARCUANA*. Wings pale yellow, with three curved bands, and a black spot on the disk, in which are three silvery dots.

\* *LECHEANA*. Upper wings testaceous; the thorax is silvery.

\* *AVELLANA*. Upper wings testaceous, with three short brown bands.

\* *HASSIANA*. The upper wings of the insects of this species are brown, with an oblique white streak.

\* *INTERROGATIONANA*. Wings red-brown, with a white flexuous line and dot, resembling a note of interrogation.

\* *MODERIANA*. Upper wings yellowish, with a marginal brown spot behind.

\* *SCHREBERIANA*. Upper wings grey, with a white triangular marginal spot.

\* *HELMIANA*. Upper wings pale yellow ferruginous, with a white triangular marginal spot.

\* *FRANCILLANA*. Wings pale yellow, with two chestnut brown streaks.

\* *GNOMANA*. Upper wings yellow, with an oblique testaceous band, and ferruginous marginal spot behind.

\* *ODORANA*. Upper wings ferruginous, spotted and reticulate with brown.

\* *ILICANA*. Upper wings brown-ash, with brown dots, and a single black one in the middle.

\* *LOGIANA*. The upper wings are grey, with irregular black specks; the lower ones whitish.

\* *DESFONTAINANA*. Wings brown-cinereous, with an abbreviated fulvous fillet in the middle, in the middle of which is a hairy dot.

\* *PROFANANA*. Wings cinereous, with a brown tufted dot in the middle.

\* *SQUAMMANA*. Upper wings green, with numerous raised dots.

\* *STICTICANA*. Wings brownish, with a common white dorsal spot, in which there is a black dot.

\* *EMARGANA*. Wings falcate, emarginate at the rib; it is brown, with reticulate dark lines.

\* *CARDANA*. Wings falcate, emarginate, the ribs grey, with a fulvous streak.

\* *SCARRANA*. The upper wings are cut off on the rib behind; they are rough cinereous, and slightly barred with brown. Found chiefly in the oak.

\* *QUERCANA*. The upper wings are rosy, with two sulphur colial spots.

\* *OCELLANA*. Wings cinereous, with a red patch in the middle, in which is a whitish dot.

\* *FORSKABLIANA*. The upper wings are yellow, and reticulate with ferruginous, with a brownish patch in the middle.

\* *LÆFLINGIANA*. The upper wings are yellow, reticulate with testaceous, and marked with a double X.

\* *BERGMANNIANA*. Upper wings yellow, varied with orange, and four silvery bands, the third bifid.

\* *YEATIANA*. Upper wings grey, with a black spot, and two central dots.

\* *ALSTROEMIANA*. Wings whitish; upper pair with a lateral rusty-brown spot in the middle.

\* *NITIDIANA*. Wings shining brown, with a broad silvery band in the middle, in which is a brown streak.

\* *NIGRICANA*. Wings blackish, the rib dotted with yellow, the tip with a black dot.

\* *PARIANA*. Wings brown, with two black streaks, and chestnut-brown hind margin.

\* *CONWAYANA*. Wings rusty brown, with silvery dots, and a yellowish dorsal spot.

\* *AURANA*. Wings brown, with two orange spots.

\* *POMANA*. Wings clouded, with red-gold spot behind.

\* *UNGLICANA*. Wings cinereous, sub-fasciate, the tip recurved and pointed, the outer margin behind transversely striate with white.

\* *CYNOSBANA*. Upper wings brown, tipped with white.

\* *SPARMANNIANA*. Wings flat, pale, with two black dots on the disk.

### TINEA.

\* *COLONELLA*. Wings oblong, cinereous, with two black dots before a curved undulate obsolete streak.

\* *PANNERELLA*. Wings oblong, brown, with a blackish line down the middle, and a few dots at the tip.

\* *PLUNIELLA*. Wings purplish-brown, with a white line in the middle, in which is a blackish spot.

\* *GELATELLA*. Wings brown-ash, with a white fillet on the upper pair.

\* *EUONYMELLA*. Upper wings silvery-white, with fifty black dots.

\* *PADELLA*. Upper wings lead-colour, with twenty black dots.

\* *LAMDELLA*. Upper wings yellow-brown, with a dark triangular spot, terminated by a detached small dot.

\* *SEQUELLA*. Upper wings white, with a common sinuate flexuous black line and lateral spots.

\* *SEMIARGENTELLA*. Upper wings silvery, with gold bands, crossing each other in the middle.

\* *IRRORELLA*. Wings yellow; upper pair with three rows of black dots; thorax fulvous before and behind.

\* *MESOMELLA*. Upper wings pale, with a yellow margin and two brown dots.

\* *GUTTELLA*. Wings black, with numerous white dots on the upper pair; the head is ferruginous.

\* *PINETELLA*. Upper wings yellowish-brown, with two clear white spots, separated by a blackish band.

\* *PRATELLA*. The upper wings are cinereous, with a clear white line branched behind, the tip with oblique striæ.

\* *PASCUELL*. Wings cinereous, with a clear white line, hind margin dotted with black.

\* *CULMELLA*. Wings cinereous, with a single abbreviated clear white line.

\* *ARGENTELLA*. Wings and body silvery; the antennæ are annulate and brown.

\* *CARNELLA*. The upper wings are of a rose colour, with yellowish anterior and posterior margins.

\* *GRAMELLA*. Wings cinereous, with two angular brown streaks, and a marginal silvery one.

\* *SALICELLA*. Wings blueish-grey, white in the middle, with black dots on the hind margin; the thorax is crested.

\* *PUSIELLA*.

## PHALÆNA.

\* **PUSSELLA.** Wings blueish-grey, with a black dot, fillet in the middle, and contiguous rhombic dots.

\* **FOENELLA.** Wings brown, with clear white spots, the anterior one falcate, the posterior kidney-shaped.

\* **CRATÆGELLA.** Upper wings whitish, with two blackish bands, and a third which is terminal.

\* **TAPEZELLA.** Wings black, white behind; head snowy. A variety has its wings and head brown. This insect is found in skins, where it gnaws cylindrical cavities and fecretes itself.

\* **VESTIANELLA.** Wings cinereous, with a white rib; the tips are ascending and feathered. This attaches itself to clothes and woollen furniture, to which it is very destructive.

\* **SARCITELLA.** The wings of this are cinereous; the thorax has a white dot on each side. Found in skins, clothes, and woollen furniture.

\* **STIGMATELLA.** Wings nearly linear, ferruginous, with a white costal spot.

\* **MELLONELLA.** Wings grey, the hind part purplish, with a white streak; the scutellum is black, tipped with white.

\* **CURTISELLA.** Upper wings and thorax white, spotted and speckled with brown; the lower wings and body are pale brown.

\* **MACULELLA.** This is snowy; the wings with a large marginal spot and tip.

\* **ARBUTELLA.** Wings rufous, with silvery streaks, the middle ones bifid. It is found chiefly on the Arbutus.

\* **MARGINELLA.** Upper wings rufous, with broad white margins.

\* **TESSELLA.** Wings black, with two very remote tesselate bands.

\* **CLEMENTELLA.** Upper wings snowy, with a black line at the base, band in the middle and dot at the tip.

\* **BICOSTELLA.** Wings cinereous, with a brown fillet; feelers projecting; antennæ hairy.

\* **PARENTHESSELLA.** Upper wings testaceous, with a longitudinal white line.

\* **RADIATELLA.** Upper wings yellow, with dark purple stripes, and white one nearer the thinner margin.

\* **ELONGELLA.** Wings linear, testaceous; the antennæ are moderate.

\* **CINCTELLA.** Wings black; the upper pair with a silvery streak.

\* **LEUCAFELLA.** Wings blackish, with two white bands; the posterior one fainter; head white.

\* **STROBILELLA.** Wings waved with brown and silvery; lower ones brown, edged with white.

\* **DODECELLA.** Grey, dotted with black; wings with pale bands, and three pair of brown dots.

\* **VIRIDELLA.** Wings greenish, with white dots, and two interrupted chestnut bands.

\* **COMBRELLA.** Wings brown, thickly speckled with whitish.

\* **FUSCELLA.** Wings grey-brown, with two black dorsal dots.

\* **CINERELLA.** Wings grey-brown, glossy, immaculate.

\* **TRIGONELLA.** Wings brown, with a common white dorsal double triangular spot.

\* **RHOMBOIDELLA.** Wings brown, with a black rhombic spot.

\* **CAPITELLA.** Wings brown, with three yellowish spots; the head is ferruginous.

\* **COMPOSITELLA.** Wings brown, with a common silvery dorsal spot, composed of four streaks.

\* **MINUTELLA.** Wings black, with two ferruginous spots, nearly opposite.

\* **PETIVERELLA.** Wings greyish, with a yellow dorsal patch and three black dots at the tip.

\* **LISTERELLA.** Wings grey-brown, with black dots at the tip; the antennæ are moderate, annulate.

\* **ALCELLA.** Snowy; upper wings spotted with black.

\* **MOUFFETELLA.** Wings pointed, livid, with oblong brown specks; antennæ short, annulate with white.

\* **ALBINELLA.** Wings brown, with a single gold curve turned upwards. It is found among the shrubs of Europe.

\* **SEPELLA.** Wings gold, with two silvery streaks. It inhabits England.

\* **MERIANELLA.** Wings black, with three transverse, divaricate, silvery bands.

\* **LYONETELLA.** Wings yellow, with four silvery bands; the third bifid above.

\* **BONNETELLA.** Wings white, with two silvery bands, and waved behind. This is found in gardens, and among hedges.

\* **SCHÆFFERELLA.** Wings orange, with silvery dots and band in the middle; the tip is fringed with black.

\* **SCOPOLELLA.** Wings black, with scattered white dots; the antennæ are annulate with white.

\* **GLEICHELLA.** Wings flat, black, with a silvery band in the middle, and two opposite spots at the tip.

\* **RHEDIELLA.** Wings black, the tip fulvous, with interrupted silver streaks.

\* **ROESELLA.** Wings black-gilt, with nine silvery convex sub-marginal dots.

\* **LEUWENHOEKALLA.** Wings gilt, with a silvery streak at the base, and four opposite dots.

\* **MYLLERELLA.** Wings gilt, with two silvery streaks at the base, and three lines near the tip.

\* **LINNEELLA.** Wings brown-gilt, with four raised silvery dots.

\* **RAYELLA.** Wings gilt, with seven silvery spots, the second and third united.

\* **SCHREBERELLA.** Wings gilt, with two silvery bands at the base, and two spots at the tip.

\* **HARRISELLA.** Wings silvery-gilt, the tip obtuse, parched, and sub-ocellate.

\* **CRAMERELLA.** Wings silvery, with oblique marginal brown lines, and a black dot at the tip.

\* **BLANCARDELLA.** Wings gilt, with a silvery line at the tip, and seven marginal spots.

\* **LICHENELLA.** Apterous, smooth, black. Found on various lichens.

### ALUCITA.

\* **MARGINELLA.** Upper wings pale brown, with snowy margins.

\* **GRANELLA.** Wings varied with white and black; the head is snowy. This is found in corn lofts, where it devours the grain, and causes it to cling together: in winter it crawls up the walls.

\* **NIVELLA.** Wings snowy, with a black band between two marginal spots; the head is white.

\* **ASPERELLA.** Upper wings emarginate at the tip, whitish, with two common blackish spots.

\* **COSTELLA.** Snowy; wings reddish-gold, with a white costal spot at the base, dotted with brown.

\* **SCABRELLA.** Wings grey-brown, with black raised dots.

\* **ARISTELLA.** Whitish; wings with a silvery line.

\* **SWAMMERDAMNELLA.** Wings pale, immaculate; the antennæ are very long.

\* **ROBERTELLA.** Wings brown, angle of the tail white; antennæ very long.

\* **FRISCHIELLA**§

\* **FRISCHELLA.** Wings brown-gold; the antennæ are moderately long, and tipped with white.

\* **CALTHELLA.** Black; upper wings gold, the head is ferruginous.

\* **DEGENERELLA.** Wings black-gold, striate with yellow in the middle a yellow band; the lower wings are brown; the antennæ are very long. The yellow lines on the upper wings are sometimes wanting.

\* **PODELLA.** Wings black-gold, striate with yellow; in the middle there is a pale band; the lower ones are purple, and the antennæ are very long.

\* **SULZELLA.** Wings black-gold, with a gold band; the antennæ are very long. This is thought to be a variety of the last.

\* **REAUWERELLA.** Wings black, bronzed outwardly; the antennæ are very long.

\* **FASCIELLA.** Wings gilt, with a brown band; the antennæ are tipped with white.

\* **SULPHURELLA.** Upper wings gilt, with two opposite sulphur spots; the lower ones are yellow.

\* **OPPOSITELLA.** Wings brown, with two yellow opposite spots; the lower ones are brown.

#### PTEROPHORUS.

\* **MONODACTYLA.** Wings expanded, linear, undivided.

\* **DIDACTYLA.** Wings cleft, red-brown, with white streaks; the upper pair bifid.

\* **TESSEPADACTYLA.** Wings expanded, cleft, clouded with cinereous; the lower ones are clouded with brown.

\* **PTERODACTYLA.** Wings extended, cleft, testaceous, with a brown dot.

\* **PENTADACTYLA.** Body and wings snowy; upper pair bifid, lower ones three-parted. The larva of this species is sixteen-footed, hairy, green, with black dots, and a white dorsal line; the pupa is hairy, green, dotted with black. It appears in August: its larva feeds on nettles.

\* **HEXADACTYLA.** Wings cleft, cinereous, spotted with brown; all of them are six-parted. This species is found on the *Ionocera xylosteum*, or Honey-suckle; it is a very elegant and beautiful insect, and often flies into the house in the evening: it makes its appearance in the month of September. It has been frequently called, by English collectors, the twenty-plumed moth; this, however, is an improper name, the plumes being, in reality, twenty-four.

**PHALAIJA**, a word invented by Basil Valentine, and used as the name of a panacea, or universal medicine; but Rolfink has since used it to express a tincture of jalap.

**PHALAINA**, *φάλαίνα* of Aristotle, a species of *Balanus*. See **MYSTICETUS**.

**PHALANGER.** See **DIDELPHUS Orientalis**.

**PHALANGIUM**, in *Botany*, *φάλαγγιον*, a name adopted, by the earlier botanists among the moderns, from Dioscorides. Their example was followed by Tournefort, Haller, and others; but Linnaeus always objected to this name, as properly belonging to an insect, to which it had been appropriated from the most remote antiquity, and for which therefore he retained it in the Zoological part of his system, preferring *Anthericum*, another ancient denomination, for the genus of plants in question. Of late, however, Jussieu and other French botanists, some of whom never heartily assented to the above decision of Linnaeus, having divided his genus *Anthericum*, have restored *Phalangium*. Whether the genus to which they have applied it, characterised by its smooth filaments, be a good one, is a matter of opinion. It is adopted by Mr. Ker in Curtis's Magazine, but not by the late Mr. Dryander in Ait. Hort. Kew. nor by Willdenow. We are inclined to admit it, but

certainly not under the above appellation, which is equally contrary to good sense and to every systematic rule. *Phalangites* presents itself as a synonym to the same plant in Dioscorides, and is unexceptionable. The flowers of this genus are observed by Jussieu to be white or purplish; those of his *Anthericum* yellow. *Anthericum græcum*, *serotinum*, Engl. Bot. t. 793, *Liliago*, *Liliasfrum*, &c., are examples of the former; *A. frutescens*, Curt. Mag. t. 816, *aloides*, t. 1317, *aphod-loides*, and several others, of the latter, in which *Narthecium* of Fl. Brit. is, by some botanists, also retained. See **ANTHERICUM** and **NARTHECIUM**.

**PHALANGIUM**, in *Entomology*, a genus of insects of the order APTERA; the generic character is, mouth with horny mandibles, the second joint with a very sharp moveable cheliferous tooth; feelers filiform; no antennæ; two eyes on the crown, and two at the sides; eight legs, the abdomen is generally rounded. There are nineteen species, divided into two sections, which are subdivided. Of all the insects of this order, few are more repulsive than those of the *Phalangium* genus. Some of them are armed with weapons resembling those of the spider genus, but operating with much malignity. They differ very much in size, some being very minute, while others are equal in magnitude to the larger kind of spiders.

A. *Mouth with a conic tubular sucker.*

a. *Four feelers, the upper ones chelate.*

Species.

\* **GROSSIPES.** Body minute, cylindrical glabrous; shoulders tuberculate; legs very long. It inhabits European seas. The body is of a dirty red, very minute and slow; it insinuates itself into the shells of muscles, and destroys the fish.

**HIRTUM.** Body filiform and hairy. It inhabits the Norway ocean, and is about the size of the last.

**SPINIPES.** Body cylindrical, slender; legs very long and spinous. This also is found in the seas of Norway.

b. *Two feelers.*

\* **BALÆNARUM.** Two feelers; body ovate, red on the back. It inhabits European seas. Found under stones. The sucker projects straight, is obtuse at the lip, with a round perforation; the feelers as long as the sucker, and placed at its base; the legs are pointed.

B. *Mouth without sucker.*

a. *Feelers projecting, incurved.*

**BICOLOR.** Body roundish and black above; legs very long, with testaceous joints and tips. It is a large insect, and is found in Switzerland.

**MORIO.** Abdomen ovate, black beneath, and base of the legs pale. It inhabits Norway, about rocks; larger than the *Opilio*, which comes next.

\* **OPILIO.** Abdomen ovate, grey, beneath whitish. It inhabits Europe and America, and wanders about by night. This is the most common insect of the genus, and during autumn it may be observed in gardens, about walls, &c.; it is remarkable for its plump, but at the same time flattish orbicular body, and its extremely long and slender legs, which are generally so carried that the body appears suspended or elevated to a considerable height above the surface on which the animal rests; the eyes are situated on the top of the head, and resemble two very minute glassy globules; the colour of the whole animal is a pale greyish-brown. This species preys on the smaller kind of insects.

\* **CORNU-**

\* **CORNUTUM.** Abdomen depressed; mandible conic, ascending; feelers resembling eggs. It is found in this country and other parts of Europe, like the last, to which it bears a resemblance.

**BILINEATUM.** Pale, with two black dotted dorsal lines. This and the next are found among the rocks of Norway.

**DIADEMA.** Thorax with an elevated spinous tubercle on the back. This tubercle is furnished with a large eye on each side.

**CARINATUM.** Brown; abdomen depressed, carinate; the fore legs are one-toothed before the tip. It is found chiefly at Dresden, and is about the size of the *Opilio*.

\* **DUO-MACULATUM.** Abdomen black, with two white spots. This is an English insect, and is described and figured by Mr. Donovan. The body is very small, ovate, and black, with two white spots; abdomen is surrounded with a very fine sub-marginal white line; the legs are long and black.

**ARANOIDES.** The claws are toothed and villous; the body oblong. Inhabits the Cape of Good Hope, and southern parts of Russia. Its bite is said to be extremely poisonous, occasioning livid tumours, and sometimes death itself. The body of this insect is soft, livid, woolly, with inflated claws.

\* **CANCROIDES.** Abdomen obovate, depressed, ferruginous; the claws are oblong and hairy. A variety has ovate claws. It is found in divers parts of Europe, besides this country, in cellars and damp places, and is the little insect which gets into our legs and under the skin, causing a very painful itching.

**ACAROIDES.** Abdomen cylindrical, yellowish; claws ovate and smooth. It inhabits America. Is twice as large as the former, and its bite is reported to be extremely painful and dangerous.

*b. Feelers thick, spinous, and furnished with a claw at the tip.*

\* **HIRSUTUM.** Feelers ferrate; body sub-oval, with ten angles. It is found in this country.

**RENIFORM.** Feelers ferrate; fore-legs very long and filiform; thorax kidney-shaped. It inhabits South America, and its islands. It is one of the largest of the genus, and has the appearance of a very large spider.

**CAUDATUM.** The feelers of the insects of this species are branched; the tail ends in a bristle. The claws are large, and toothed on the inside towards the tips. It is a native of the East Indies.

**LUNATUM.** Feelers very long, and spinous at the tip; thorax kidney-shaped. It inhabits America. The feelers are four times as long as the body, they are smooth, except at the tip, which is very spinous.

**PHALANGIUM Apulum,** the *Apulian phalangium*, a name given by authors to that large and poisonous species of spider, called by the vulgar the tarantula, from the name of a city of Calabria, Tarantum; near which it is very common.

**PHALANGOSIS,** from *Φαλαγγίς*, a row of soldiers, in *Surgery*, a disease, in which the row of hairs, composing the eye-lashes, turn inward, and irritate the eye. See *TRICHIASIS*.

**PHALANX,** in *Anatomy*, a name applied to the bones of the fingers and toes, which are distinguished by the numerical terms, first, second, and third, reckoning from the metacarpus and metatarsus. The two rows of carpal bones are also called phalanges; the first or radial, the second or metacarpal.

**PHALANX,** *Φαλαγγίς*, in *Antiquity*, a huge, square compact battalion, formed of infantry, set close to one another,

with their shields joined, and pikes turned cross-ways; infomuch that it was almost impossible to break them.

It consisted of eight thousand men: Livy says, that this sort of battalion was invented by the Macedonians, and that it was peculiar to them; whence, among writers, it is sometimes called the *Macedonian phalanx*.

St. Evremont observes, that the Macedonian phalanx had the advantage in valour and strength over the Roman legion.

**PHALANX,** in *Natural History*, a term used by Dr. Woodward, and some other writers of fossils, to express an arrangement of the columns of that sort of fossil coralloid body found frequently in Wales, and called *lithostrotion*.

In the great variety of specimens which are found of this, some have the whole phalanx of columns cracked through, and others only a few of the external ones; but these cracks never remain empty, but are found filled up with a white spar, as the smaller cracks of stone usually are. This is not wonderful, as there is much spar in the composition of this fossil; and it is easily washed out of the general mass to fill up these cracks, and is then always found pure, and therefore of its natural colour, white. The lithostrotion, or general congeries of these phalanges of columns, is commonly found immerged in a grey stone, and found on the tops of the rocky cliffs about Milford in Wales. It is usually erect, though somewhat inclining in some specimens, but never lies horizontal. It seems to have been all white at first, but to have been since gradually tintured with the matter of the stone in which it lies. The single columns which form each phalanx are usually round or cylindrical, though sometimes flattened and bent; some of them are also naturally of an angular figure; these, however, are not regular in the number of their angles, some consisting of three sides, some of five, and some of seven; some are hexangular also, but these are scarce. They are from five or six to sixteen inches in length; and the largest are near half an inch over, the least about a quarter of an inch; the greater number are very equal to one another in size; but the sides of the columns being unequal, the same column measures of a different thickness when measured different ways; the phalanges or congeries of these are sometimes of a foot or more in diameter.

The columns are often burst, as if they had been affected by external injuries; and it is evident, that they were not formed before several other of the extraneous fossils; for there are found sometimes shells of sea-fishes and entrochi immerged and bedded in the bodies of the columns. It appears plainly from hence, that when these bodies were washed out of the sea, and tossed about in the waters which then covered the tops of these cliffs, this elegant fossil, together with the stony bed in which it is contained, were so soft, that these other bodies found entrance into their very substance, and they were formed, as it were, upon them. This fossil takes an elegant polish, and makes in that state a very beautiful appearance, being of the hardness of the common white marble, and carrying the elegant structure visible in the smallest lineaments. Woodward's Coll. of Foss. p. 11.

**PHALARIS,** in *Biography*, tyrant of Agrigentum, in Sicily, who rendered himself famous by the cruelties which he committed, but of whose personal history very little is known. He is thought to have been born in Crete, and to have been banished from that island on account of his political intrigues. He went to Sicily, and by his abilities was enabled to obtain the sovereignty of Agrigentum about the year B. C. 571. He found it necessary to maintain by harshness and severity, the place to which he had risen by force

force or fraud, and he became one of the most detested of tyrants. The most marked instance of his cruelty is his punishment by the brazen bull. (See AGRIGENTUM, and BULL of Phalaris.) There is extant a series of letters under the names of Phalaris and Abaris, the genuineness of which has been the subject of much controversy, especially between the honourable Charles Boyle and the celebrated Dr. Bentley. Boyle, who gave an edition of those epistles with a new Latin version, in 1695, made a reflection upon the conduct of Bentley in his preface, which induced the critic to undertake to prove that the letters were spurious, and consequently the labour bestowed upon them useless. He carried his point, and the spuriousness of the epistles of Phalaris is now generally admitted: hence the circumstances of his life deduced from them lose their authority. An history of Phalaris was published in 1726, by a Frenchman, entitled "L'Utilité du Pouvoir Monarchique," &c. which is a mere romance. Perhaps the latest edition of the Epistles is that of Valkenaer, Groningen, 4to. 1777. Universal Hist. Moreri.

PHALARIS, in Botany, supposed to be the *ζαῖρα* of Dioscorides, with whose description the first or principal species tallies tolerably well, and answers still better to the idea of the name, in the neat shining aspect of its glumes and seeds.—Linn. Gen. 32. Schreb. 45. Willd. Sp. Pl. v. 1. 326. Mart. Mill. Dict. v. 3. Sm. Fl. Brit. 62. Prodr. Fl. Græc. Sibth. v. 1. 36. Ait. Hort. Kew. v. 1. 137. Juss. 29. Lamarek Illustr. t. 42. Gærtn. t. 80. Schrad. Germ. v. 1. 177.—Class and order, *Triandria Digynia*. Nat. Ord. *Gramina*.

Gen. Ch. reformed. *Cal.* Glume single-flowered, of two compressed, nearly equal, keeled, acute valves, their straight parallel margins brought close together. *Cor.* but half the size of the calyx, and concealed within it, double; the outermost smallest, of one or two lanceolate, acute, keeled, nearly equal, more or less downy valves, closely applied to the back of the innermost, which consists of two larger, oblong, concave, acute valves, finally permanent and cartilaginous, investing the seed, the inner one smallest. Necessary of two lanceolate, pointed, pelucid leaves, tumid at the base. *Stam.* Filaments three, capillary; anthers oblong, forked at each end. *Pist.* Germen ovate; styles two, capillary, combined at the base; ligulas villous. *Peric.* non, except the permanent hardened inner corolla, which does not separate. *Seeds* solitary, ovate-oblong, acute, smooth.

Ess. Ch. Calyx single-flowered, of two, nearly equal, keeled valves, enclosing the double corolla. Seed coated with the hardened inner corolla.

Many changes, and some mistakes, have taken place with regard to the species of this elegant genus of grasses, so that it is necessary to exhibit the whole in detail.

1. *Ph. canariensis*. Common Canary-grass. Linn. Sp. Pl. 79. Willd. n. 1. Ait. n. 1. E. gl. Bot. t. 1310. Knapp. t. 3. Mart. Russ. t. 17. Schreb. Gram. t. 10. f. 2. Leers t. 7. f. 3. Sm. Fl. Græc. Sibth. v. 1. 40. t. 55. Phalaris; Ger. Em. 86. Matth. Valgr. v. 2. 270.)—Panicle ovate, spike-shaped. Valves of the calyx boat-like. Outer corolla of two valves; inner one villous. Root fibrous.—Native of cultivated fields in the south of Europe; naturalized occasionally in England, flowering in July and August, and generally occurring about dunghills. It is sown as a crop, chiefly in the county of Kent, according to professor Martyn, being much used as the food of singing birds in cages. The root is annual, of several branched fibres. Stems several, eighteen inches or two feet high, bent at the lower joints, but otherwise erect, round,

leafy, smooth. *Leaves* spreading, lanceolate, taper-pointed, rather glaucous, roughish beneath; their sheaths long, striated, inflated upwards, especially the uppermost. *Stipula* blunt, mostly torn. *Spikes* terminal, solitary, an inch or two long, thick, very handsome; the valves of the calyx, the only ones that are visible, being prettily striped with green and white; they are usually smooth, sometimes a little downy, the white dilated keel of each often furnished with a notch near the summit. The outer corolla is of two equal lanceolate smooth valves, clasped close to the keels of the valves of the inner, which are downy and unequal. *Anthers* yellow, prominent. Linnæus and Schreber reckon the outer corolla an inner calyx, perhaps not incorrectly.

2. *Ph. nodosa*. Knotty Canary-grass. Linn. Syst. Veg. ed. 14. 104. Willd. n. 5. Sm. Fl. Græc. Sibth. v. 1. 41. t. 56. (Ph. tuberosa; Linn. Mant. 557. Ph. bulbosa; Cavan. Ic. v. 1. 46. t. 64. Ph. bulbosa, albo semine; Scheuch. Agr. 53. t. 2. f. 3 F.)—Panicle lanceolate, spike-shaped. Valves of the calyx boat-like. Outer corolla of one valve. Stems bulbous at the base.—Native of the south of Europe. Barnadez found it in Spain; Sibthorp about the borders of fields in the Archipelago. The root is perennial, of many downy fibres. Stems numerous, twelve or eighteen inches high, ascending, leafy; decumbent at the base, where two or three of the lower joints are tumid and ovate, assuming a bulbous aspect, which shews that the plant is accommodated to a soil whose moisture varies much. *Leaves* spreading, grass-green, linear, longer and narrower than in the preceding, with close sheaths, and long stipulas. The spike is also much narrower and rather longer. Keel of the calyx entire, roughish. Outer corolla of only one lanceolate villous valve. Linnæus cultivated this species at Upsal, and from a more accurate observation of its root, was led to change the name he had given it in the *Maniffu*, to *nodosa*. It has been much misunderstood, and is a stranger to our gardens.

3. *Ph. aquatica*. Water Canary-grass. Linn. Sp. Pl. 79. Willd. n. 2. Ait. n. 2. Sm. Fl. Græc. Sibth. v. 1. 42. t. 57. Schrad. Germ. v. 1. 179. Hoff. Gram. Austr. v. 2. 29. t. 39. (Ph. minor; Retz. Obs. fasc. 3. 8. Ehrh. Exicc. 61. Gramen typhinum phalaroides majus bulbosum aquaticum; Barrel. Ic. t. 700. f. 1.)—Panicle cylindrical, spike-shaped. Valves of the calyx boat-like, somewhat crenate. Outer corolla of one valve. Root knotty, creeping.—Native of Egypt and of the Tiber, according to Linnæus. Dr. Sibthorp found it in watery situations in Asia Minor. The root is branched, knotty and jointed, creeping, with numerous downy fibres. All authors, even the accurate Schradler, assert it to be annual, which nobody could suppose from its appearance. Stems erect, straight, smooth and rather glaucous, in our specimens four or five feet high; Schradler says a foot and a half. *Leaves* very long and rather narrow, rough on both sides; the sheaths long and tight. *Panicle* from three to five inches long, cylindrical, bluish, three quarters of an inch thick. Keel of the calyx thin, with several small shallow irregular notches. Outer corolla of one minute, lanceolate, close-pressed, villous glume; both valves of the inner more or less silky. This species has long been cultivated at Paris, as appears by the Linnæan herbarium, and was sent to Kew by M. Thouin in 1778. Ehrhart's specimen agrees exactly with our's, except in being less luxuriant. We see no reason for rejecting Barrelier's synonym.

4. *Ph. carulefcens*. Bluish Canary-grass. Desfont. Atlant. v. 1. 56. (Gramen phalaroides hirsutum, spica longissima; Buxb. Cent. 4. 30. t. 53.)—Panicle cylindrical, spike-shaped, rather lax. Valves of the calyx boat-like,

tapering, pointed. Corolla acute.—Gathered by Buxbaum, in meadows about the Bosphorus, in May; by Desfontaines in fields at Algiers. This is compared by the latter to *Pb. bulbosa*, by which there is good reason to suppose he meant the grass so called by Linnæus; see *PHLEUM tenue*. Buxbaum took his plant for that of Barrelier, cited under our last species, and therefore found fault with that figure; but he was mistaken, as was Linnæus no less in citing him under *aquatica*, from which the plant of Buxbaum and Desfontaines seems to differ in having smooth leaves, and a more lax panicle; but especially in the calyx, which is blueish, with taper-pointed valves. We do not understand why Buxbaum terms his “a hairy grass.” We have seen no specimen, and as Desfontaines does not advert to the double corolla, even in *Pb. canariensis*, it is impossible to ascertain from him whether the present plant has one or two valves in the outer corolla. His expression of “an inner calyx,” in these and other grasses, alludes only to the corolla altogether, after the French mode.

5. *Ph. paradoxæ*. Brittle-spiked Canary-grass. Linn. Sp. Pl. 1665. Willd. n. 11. Ait. n. 6. Sm. Fl. Græc. Sibth. v. 1. 43. t. 58. Schrad. Germ. v. 1. 179. Linn. fl. Dec. 2. 35. t. 18. Schreb. Gram. 93. t. 12. Hoff. Gram. Austr. v. 2. 30. t. 40.—Panicle cylindrical, obtuse, spike-shaped. Valves of the calyx single-toothed, awned. Lower flowers abrupt and abortive.—Native of Istria, Italy and Greece, in cultivated ground, flowering in May and June. Root annual, of many downy fibres. Stems numerous, ascending, 12 or 18 inches high, bent at the joints, almost entirely clothed with the long, more or less inflated, sheaths of the leaves, the uppermost of which embraces the lower part of the panicle, where a great many of the flowers assume a strange appearance, being starved, abortive, and of an abrupt wedge-like figure. The flowers above, in their natural state, are prettily variegated with green and white. Calyx-valves lanceolate, each with a broad, but partial and acute, dilatation of the keel, like a tooth, and a terminal rough straight awn, various in length. Schrader has observed a minute outer corolla of two valves; the inner consists of two, rather unequal, ovate, acute, somewhat downy ones. Seed minute. Linnæus observed, that all the flowers became perfectly formed, in cultivated specimens.

6. *Ph. arundinacea*. Reed Canary-grass. Linn. Sp. Pl. 80. Fl. Dan. t. 259. Ehrh. Calam. 51. Schrad. Germ. v. 1. 180. t. 6. f. 5. Engl. Bot. t. 402. and t. 2160. f. 2. Hoff. Gram. Austr. v. 2. 25. t. 33. Leers 18. t. 7. f. 3. (*Arundo colorata*; Soland. in Ait. H. Kew. ed. 1. v. 1. 116. Dryand. in ed. 2. v. 1. 174. Sm. Fl. Brit. 147. Prodr. Fl. Græc. Sibth. v. 1. 69. Knapp. t. 98.)—Panicle upright, with spreading branches. Flowers crowded, leaning one way.—Native of rivers, ditches and lakes, throughout Europe, flowering in July. A variety with variegated leaves is common in gardens. The root is perennial, creeping and tufted, spreading to a great extent. Stems from two to five feet high, erect, strong, reedy, smooth and leafy, with several joints. Leaves also reed-like, lanceolate, striated, pointed, smooth, rather glaucous, with tight, or scarcely swelling, sheaths. *Stipula* short, bluntish. Panicle very different from any of the preceding, consisting of numerous, compound, angular, rough branches, turned one way, and bearing numerous, crowded, often purplish, tufts of flowers. The calyx-valves are lanceolate, nearly equal, keeled, ribbed, awnless. Outer corolla of two very minute, linear, gibbous, hard valves, each bearing a tuft of hairs exceeding their own length. These hairs misled the ingenious Dr. Solander to refer the grass in question to *Arundo*, a mistake in which we concurred in Fl. Brit. but

which is now corrected in *Engl. Bot.* by the substitution of a new page 402, in consequence of the very accurate remarks of Dr. Schrader, whose *Flora Germanica* excels every work, in this tribe of plants, that we have seen.

7. *Ph. capensis*. Cape Canary-grass. Thunb. Prodr. 19. Willd. n. 3.—“Panicle ovate, spike-shaped. Glumes entire. Stem bent and decumbent.”—Native of the Cape of Good Hope. Having seen neither specimen, nor any further description of this species, we dare not remove it from *Phalaris*, though it may possibly be a *Pbleum*.

To the latter genus we now refer the Linnæan *Phalaris bulbosa*, *dentata*, *phleoides*, as well as *arenaria* of Fl. Brit. and *aspera* of Willdenow. The *utriculata* is shewn in Fl. Græc. t. 63 to be an *Alopecurus*, beyond all possible doubt; *oryzoides* will be found under *Leersia*; *xizanoides* is *Andropogon muricatum*, Retz. Obs. fasc. 3. 43. *Ph. bifida*, Thunb. Jap. 44, appears a very doubtful plant, but there is evidently no reason to retain it here. See *PHLEUM*.

*PHALARIS*, in *Agriculture*, the title of a genus of grasses, of which there are several species, but none that can be introduced into field culture with advantage. It is the canary grass.

*PHALARIS*, in *Ornithology*. See *FULICA Atræ*.

*PHALARIS's Bull*, in *Ancient History*, was a brazen bull for tormenting criminals, constructed by Perillus the Athenian, in order to flatter the cruelty of Phalaris, tyrant of Agrigentum. The artist, demanding too great a reward for his contrivance, was the first who suffered in it. Some have treated this fragment of ancient history as a fable; but we learn from Diodorus Siculus, lib. xiii. cap. 13. that Scipio Africanus, when he razed Carthage, about 260 years after the destruction of Agrigentum, found among other things this bull, and restored it to the inhabitants of Agrigentum, where it was to be seen when Diodorus wrote his history, viz. in the reign of Augustus. See *BULL of Phalaris*.

*PHALAROPE*, in *Ornithology*, is a species of the *tringa* in the Linnæan system. Mr. Pennant gives the following general character of this species: the bill is straight and tender; the nostrils minute; the body and legs like those of the sand-piper, and the toes furnished with scalloped membranes. He also more particularly describes the grey phalarope, or *tringa lobata* of Linnæus, and the red or *tringa hyperborea* of the same author. See *TRINGA*.

*PHALEMPIN*, in *Geography*, a town of France, in the department of the North; 9 miles S.W. of Lille.

*PHALERA*, the name of a bandage for the nose, described by Galen in his Treatise on Bandages.

*PHALERÆ*, among the *Ancients*, horse-trappings.

*PHALERUM*, in *Ancient Geography*, the most ancient port of Athens, which, being found narrow and inconvenient, was succeeded by the more capacious harbour of Piræus, constructed by Themistocles. (See *PIRÆUS*.) Phalerum was distant from the city, according to Thucydides, 35 stadia, but, according to Pausanias, only 20. It was from this port that Mnestheus, an ancient king of Athens, took his departure with a squadron for the siege of Troy. Theseus likewise went from hence to Crete, to combat the Minotaur. Near this port was a temple of Ceres, a temple of Minerva Scirada, so called after Sciras, one of the prophetesses of Dodona, a temple of Jupiter, some altars to unknown gods, different altars to several heroes, such as the children of Theseus and those of Phalerus, from whom this port derived its name, and who was ranked among the Argonauts, and an altar to Androgeus, with this brief inscription, “To the Hero.” Pausan. in Attic. On the road which led from Phalerum to Athens there had subsisted for

for a long time a temple of Juno, which was burnt by Mardorus, on occasion of the invasion of the Persians. See ATHENS.

PHALEUCUS, or PHALLOUS, in *Poetry*, a kind of verse, in use among the Greeks and Latins; consisting, like the Sapphic, of five feet; the first a spondee, the second a dactyl, and the three last trochees.

The phaleucus is very proper for epigrams. Catullus excelled in it. Its original author is not known; though some have said it derives its name from its inventor.

PHALLICA, *φαλλικα*, in *Antiquity*, feasts or sacrifices celebrated at Athens, in honour of Bacchus.

The Phallica were instituted on the following occasion: one Pegasus, a citizen of Eleutheris, having carried some statues of Bacchus to Athens, drew on himself the laughter and contempt of the Athenians. Soon after this, the people were seized with an epidemic disease; and, upon consulting the oracle how to get free of it, were answered, that there was no way but to receive Bacchus in pomp: they did it, and thus instituted the Phallica; wherein, besides the statues and trophies of the god, they bore figures of the parts affected, tied to thyrus.

PHALLOPHORI, *φαλλοφορια*, a name given at Sicily to certain mimes, who ran about the streets smitten with black, and clothed in sheep skins, bearing baskets full of various herbs, as chervil, brachia ursina, violet, ivy, &c.

The word is formed from *φαλλος*, a pole, at the end of which was fastened the figure of a human penis made of leather; and *φορος*, I bear.

They danced in cadence, and were crowned with ivy, in honour of Bacchus; carrying the phallus before them as the ensign of their office.

PHALLUS, in *Botany*, a genus of *Fungi*, whose whimsical conformation bears too striking a resemblance to the Greek *φαλλος* to be overlooked or dissembled. Linn. Gen. 568. Schreb. 769. Mart. Mill. Dict. v. 3. Perf. Syn. 242. Hudf. 629. Juss. 4. Lamarek Illustr. t. 885. Venten. Mem. de l'Inst. v. 1. 503. Ur. Annal. fasc. 21. 67.—Class and order, *Cryptogamia Fungi*. Nat. Ord. *Fungi*.

Ess. Ch. Volva radical. Head ovate, stalked, entire, clothed with a fluid containing the seeds.

Obs. The above characters, to which the genus in question is very justly restricted by Persoon, exclude from it the several kinds of Morel (see MORCHELLA), which indeed have no natural affinity in texture, characters, or properties to *Phallus*, though confounded with it by Linnæus and his followers, as well as by Ventenat. The following are all the genuine species known.

#### Section 1. Head reticulated and cellular.

1. *Ph. fatidus*. Common Stink-horn. Sowerb. Fung. t. 329. (*Ph. impudicus*; Linn. Sp. Pl. 1648. Curt. Lond. fasc. 3. t. 72. Bolt. Fung. t. 92. Bull. Fr. t. 182. Fl. Dan. t. 175. Schæff. Fung. t. 196—198. *Ph. vulgaris*, &c.; Mich. Gen. 201. t. 83.)—Stalk with numerous perforations, somewhat oblique. Head honey-comb-like, pervious.—This occurs not unfrequently in autumn, on a sandy soil, in various parts of Europe, either on open heaths, or under trees; exciting attention by the odious scent, which it diffuses widely around, while the liquor is flowing from the head, and which is, naturally enough, often mistaken for that of carrion. The root is fibrous. *Volvas* several together, partly buried in the ground, white, each resembling a hen's egg in size and shape. *Stalk* erect, the growth of a few hours, about six inches high, tubular, whitish, highly cellular and tender, an inch, or almost two, in diameter. *Head* ovate, uncon-

nected, except at the top; externally much like a honey-comb, pale, but covered when at maturity with a viscid, fetid, greenish-black fluid, which soon runs off, carrying away the seeds. Flies are very fond of this fluid.

2. *Ph. cancellatus*. Latticed Stink-horn. Perf. n. 2. Venten. n. 10. (*Ph. volvatus*, pileo apice clauso; Rothm. Stockh. Transf. for 1742. 19. t. 2. *Ph. alpinus*, volva subrotundâ albâ, pileolo cellularo, umbilico pervio carente, pediculo dilutè fulvescente; Mich. Gen. 202. *Boletus phalloides*; Petiv. Oper. v. 1. 6. t. 129. f. 10.)—Stalk cylindrical, even. Head reticulated, impervious.—Native of Sweden, in barren mossy ground, as well as of mountains in Tuscany, having been found by Tozzi, who sent a figure of it to Petiver, in woods about the celebrated monastery of Valumbrosa. Its size, and general aspect, are like the former, with which Linnæus confounds it, nor does even Persoon aver it to be indubitably distinct. Yet the specific character appears decisive. Its scent is reported to be agreeable, and like some of the *Orchis* tribe.

3. *Ph. indusatus*. Veiled Stink-horn. Venten. n. 13. Perf. n. 3. (*Ph. dæmonum*; Rumph. Amboin. v. 6. book 11. 31. t. 56. f. 7.)—Stalk round, cellular, with a net-like veil. Head roundish, reticulated, pervious.—The plant which Ventenat describes was found abundantly in the French settlements at Guiana, by Vaillant, father of the romantic African traveller, in the year 1755. Its *volva* was not observed. The *stalk* is six inches high, milk-white, tubular, its surface covered with blisters, which at length burst, and become cells. *Head* bell-shaped, connected only at the top, reticulated, or like a honey-comb, of a deep blue, the elevated reticulations white. From the lower margin of the head hangs down an ample, very tender, net-like veil, at first white, then reddish, gradually expanded, and finally reaching to the ground, which is the greatest peculiarity of this species. Rumphius's Amboyna plant does not appear to us specifically different. He attributes to it a very intolerable scent, which Vaillant did not observe, and speaks of it as held in abhorrence by the Malays, who ingeniously imagine this fungus to spring from the urine of demons. Dr. Buchanan found in Upper Nepal, in August, a single specimen which answers to the above description, but which decayed before he could have it delineated. In this the head was livid, the veil of a pale straw-colour; but probably these parts may undergo changes in this respect; during their rapid growth. After all, we do not mean to assert that there may not be several species furnished with a veil, but we have not materials to distinguish them.

#### Section 2. Head tuberculated, combined with the Stalk.

4. *Ph. inodorus*. Small Scentless Stink-horn. Sowerb. Fung. t. 330. (*Ph. caninus*; Schæff. Fung. t. 330. Curt. Lond. fasc. 4. t. 73. Perf. n. 4. Venten. n. 7.)—Stalk cylindrical, with numerous perforations, yellowish. Head united with the stalk, red, plaited lengthwise, impervious. This very pretty species is not half the size of the first, and much more rare. It is found every autumn, in Caen wood near Hampstead, and very frequently in the woods of Coffey and Crown Point, near Norwich. Mr. Sowerby says the unopened *volva*, brought into the house in an evening, has before morning produced a full-grown plant, but he never observed it to grow in the day-time. We have, on the contrary, had these plants before us, while writing, during a whole morning, and have seen them shoot up in the course of three or four hours. They may be observed without inconvenience, being destitute of the fetor of our other British species. The root is much branched, spreading

spreading horizontally to a great extent, and producing here and there solitary, ovate, whitish *volvas*. Stalk two or three inches high, and half an inch thick, yellowish. Head while covered with its viscid liquor, not unlike a pickled olive in size and colour, but when that substance is removed, which happens more tardily than in the *fatidus*, the head appears of a dull red, plaited or furrowed longitudinally, and without any terminal orifice: its lower edge moreover is closely united with the stalk.

5. Ph. *Mokufin*. Chinese Stink-horn. Cibot Act. Petropol. v. 19. 373. t. 5. Linn. Suppl. 452. Perf. n. 5. Venten. n. 8.—Stalk with five angles. Head acute, in five deep cohering segments.—Grows on the old decaying roots of Mulberry trees in China. Father Cibot, one of the missionaries, observed it about Pekin, and sent a full account, with excellent drawings of the plant, to the Academy of Petersburg. Its growth is rapid, size rather inferior to the last, and iscent very offensive. The *volva* resembles that of *Ph. inodorus*. Stalk rather curved, hollow, very tender and cellular, of a delicate flesh-colour at the base, which becomes deeper afterwards. The greatest peculiarity of this species is the stalk having five angles, and the red head being deeply divided into as many oblong portions, all cohering, and cemented, as it were, by the greenish viscid fluid which envelopes the seeds. Insects are said to devour this fungus as soon as it comes in their way. It is reported to vary greatly in size in various parts of China, and in some to be eatable, though in others poisonous. Perhaps several species are confounded under the above name. The ashes of the burnt fungus are esteemed serviceable if sprinkled over cancerous ulcers.

6. Ph. *Hadriani*. Smooth Dutch Stink-horn. Venten. n. 11. Perf. n. 6. (Phallus n. 140; Sterb. Fung. 277—279. t. 30. f. A—G. Fungus marinus; Dod. Pempt. 483. Fungus; Ger. Em. 1583. f. 2.)—“Stalk cylindrical, spotted with grey. Head smooth and even, with a prominent dilated orifice.” This is said by Dodonæus to grow on the sand-hills which border the coast of Holland, amongst *Carices*. It is represented with a double *volva*, an even, not cellular, stalk and head, the latter with a prominent wide mouth. Sterbeek's figures A—D seem intended for the same plant, in an earlier state, as his E—G. The latter representations are copied from Dodonæus, and repeated over and over again in various books; they are also copied in Barrelier's t. 1258. As no recent author seems to have observed this species, we cannot but suppose it a variety, or perhaps misrepresentation, of the *fatidus*, which is found on our Norfolk coast, opposite to Holland, in the situations mentioned. The specific name alludes to Hadrianus Junius, who has described the plant in a copy of Latin verses, printed by Dodonæus.

*Fungus phalloides gallus*, Barrel. t. 1264, appears, as Perfoon well observes, a distinct species. Possibly it may be akin to the *cancellatus*, n. 2. Were it not for the *volva*, we should suspect it might be a bad representation of Perfoon's *Merchella costata*; *Boletus* of Micheli, t. 85. f. 3.

*PHALLUS Marinus*, a name given by some authors to a species of *canalis* or *tubulus marinus*, found about Amboyna, and called by the French writers *priape* and *arrosoir*. It is an oblong shell, with a large head, which is pierced full of holes; so that it at once resembles the glans penis, and the nose of a watering-pot, used by gardeners.

*PHALSBOURG*, in *Geography*, a town of France, in the department of the Meurthe, and chief place of a canton, in the district of Sarrebourg, founded in 1570, and fortified by Vauban in 1680; 4 miles E.N.E. of Sarrebourg.

The place contains 2032, and the canton 12,760 inhabitants, on a territory of 197½ kilometres, in 27 communes.

*PHANAGORA*, a town of Russia, in the government of Caucasus, at the mouth of the Kuban, on the coast of the Black sea; called by the Tartars “Taman,” without a harbour; 60 miles E. of Theodosia. N. lat. 45°. E. long. 36° 40'.

*PHANATIC*, *PHANATICUS*, commonly written *fanatic*, a visionary; one who fancies or thinks he sees spectres, spirits, apparitions, or other imaginary objects, even when awake; and takes them to be real.

Such are phrenetics, necromancers, hypochondriac persons, lycanthropi, &c. See *PHRENZY*, *HYPOCHONDRIASIS*, *LYCANTHROPY*, &c.

Hence the word is also applied to enthusiasts, pretenders to revelation, new lights, prophecies, &c. See *FANATIC*.

*PHANERA*, in *Botany*, from *φανερως*, *conspicuous*, a genus of Loureiro's, founded on the *Baubinia scandens*, Linn. Sp. Pl. 535, the *Folium linguæ*, Rumph. Amboin. v. 6. 1. t. 1. This plant, it seems, has but three *flamens*, and a *calyx* of four leaves. Its habit however is altogether that of a genuine *Baubinia*, a genus in which the structure of both those parts is variable. Rumphius says the *flowers* are white or yellowish; Loureiro describes them scarlet. See *BAUHINIA*.

*PHANTASM*, *φαντασμο*, *phantom*, a species of an object perceived by an external sense, and thence retained in the phantasy.

Aristotle taught, that all the objects of our thought enter at first by the senses; and, since the sense cannot receive external material objects themselves, it receives their species, that is, their images or forms, without the matter; as wax receives the form of the seal, without any of the matter of it. These images or forms, impressed upon the senses, are called “sensible species,” and are the objects only of the sensitive part of the mind; but by various internal powers, they are retained, refined, and spiritualized, so as to become objects of memory and imagination, and at last of pure intellect. When they are objects of memory and of imagination, they get the name of “phantasms.” When by farther experiment, and being stripped of their particularities, they become objects of science, they are called “intelligible species:” so that every immediate object, whether of sense, of memory, of imagination, or of reasoning, must be some phantasm or species in the mind itself. Such was the theory of the Peripatetics, with regard to the objects of our thought; and it has been said that the doctrine of modern philosophers concerning ideas is built upon it. Mr. Locke, who uses this word frequently, tells us that he means the same thing by it, as is commonly meant by species or phantasm. Gassendi, from whom Locke borrowed more than from any other author, says the same. The words species and phantasm are terms of art in the Peripatetic system, and from this we are to learn the meaning of them. We shall here add, that the theory of Democritus and Epicurus, on this subject, was not very unlike to that of the Peripatetics. They held, that all bodies continually send forth slender films or spectres from their surface, of such extreme subtilty, that they easily penetrate our gross bodies, or enter by the organs of sense, and stamp their image upon the mind. The sensible species of Aristotle were mere forms without matter. The spectres of Epicurus were composed of a very subtle matter. See *IDEA*, *PERCEPTION*, and *Mental PHILOSOPHY*.

*PHANTASMAGORIA*, a term which denotes the raising of spectres, is a species of magic lantern, exhibited on a large scale, and projecting an image on a semi-transparent

rent screen of taffetas, instead of a wall. For the principle of the construction, see *MAGIC Lantern*.

**PHANTASTIC**, in *Music*. Phantastic style is a free, easy manner of composition; proper for instruments. See **STYLE**.

**PHANTASTICAL COLOURS**, is a denomination given by the Peripatetics to those colours exhibited by the rainbow, or a prism; they erroneously supposing them not to be real colours, but only phantoms, or deceptions of the sight.

But many experiments of the moderns, and particularly those of sir Isaac Newton, demonstrate the contrary, and prove them as real as any other colours in nature. See **EMPHATICAL**.

**PHANTASY**, or **FANCY**. See **IMAGINATION**.

**PHARÆ**, or **PHARES**, in *Ancient Geography*, a town in the eastern part of Achaia, on the river Melas, distinguished by a variety of beautiful ornaments. It had a statue of Mercury *Agoreus*, and also opposite to it another statue, which represented the goddess *Vesta*; and it was famous for its oracles.—Also, a town of Messenia, on the Messenian gulf, N.W. of Cardamyla. Its foundation is ascribed to Phares, the son of Mercury and Philodamæa, one of the daughters of Danaus. Among other divinities revered in this place were *Nicomachus* and *Gorgazus*, sons of *Machaon*. They had both governed this city after the death of their father, to whom as well as themselves was attributed the art of healing maladies. Hence arose the veneration paid in this place to demi-gods. Their temples were full of the richest presents, and almost constantly emitted the incense of sacrifices. Here was a beautiful temple of *Fortune*. *Pharæ* was situated at the distance of six stadia from the sea, and near it was a sacred grove dedicated to *Apollo Carneus*; and in this grove a fountain.—Also, a town of the island of Crete, in which was a colony of Messenians.—Also, a town of Greece, in *Bœotia*.

**PHARAMBARA**, in *Ancient Geography*, a town of Asia, in the interior of Media, between *Tigrana* and *Tachafara*. *Ptolemy*.

**PHARAN**, a desert of Arabia *Petræa*, near *Kadesh-Barnea*. It was in a place of this desert, called “*Rothma*,” that the Israelites had their 15th station.

**PHARAN**, in *Geography*, a town of Arabia *Petræa*, near the gulf of *Suez*, once the see of a bishop, but now sunk into decay; 40 miles N. of *Tor*.

**PHARAOH**, in *Biography*, a common name of the kings of Egypt. The etymology of this name is variously stated by different writers. *Le Clerc*, in *Gen. xii. 15*, derives it from the root *pharah*, to be exalted, or to be superior. The abbé *Renaudot* says, that Pharaoh is the same as the Egyptian word *poura*, which signifies a king. *Kircher* deduces Pharaoh from the word *pharah*, which sometimes signifies to deliver; and he would have Pharaoh to denote one who is exempted from the jurisdiction of the laws. *Josephus* says (*Antiq. l. viii. c. 2.*), that all the kings of Egypt, from *Minæus* (or *Menes*), the founder of *Memphis*, who lived several ages before *Abraham*, had the name of Pharaoh, down to the time of *Solomon*, for more than 3300 years. He adds, that when these princes ascended the throne, they assumed this name, laying aside their former appellation; the word Pharaoh, in the Egyptian language, signifying a king. Accordingly *Josephus* says, that *Herodotus* names none of the kings of Egypt after *Minæus*, the builder of *Memphis*, though he had 330 kings for his successors, because they had all the name of Pharaoh; but he names an Egyptian queen, *Nicaule*, (or *Nitocris*,) who succeeded them. *Josephus* also says, that he

finds from the ancient records of the Jewish nation, that after the age of *Solomon*, no king of Egypt had the name of Pharaoh. *Josephus* seems to have misunderstood and misrepresented the account given by *Herodotus*: for this ancient historian expressly says, that in the books of the Egyptian priests were registered the names of 330 kings, of whom 18 were Ethiopians, and a woman who was a foreigner, called *Nitocris*; and the others were Egyptians. These princes had each his proper name in this catalogue. We see also in the fragments of *Manetho*, that each king of Egypt had a name peculiar to him; and we find the name of Pharaoh only in scripture. *Josephus* is also mistaken in asserting, that since the time of *Solomon*, the kings of Egypt had no longer the name of Pharaoh; since we find this name under *Hezekiah* (2 Kings, xviii. 20.), under *Josiah* (ch. xxiii. 29, 30, &c.), under *Jehoiakim* (ch. xxiii. 35.), and in the prophets *Isaiah*, *Jeremiah*, and *Ezekiel*; who are much later than *Solomon*. It is very probable, that the Egyptians gave the name of Pharaoh to their kings, as long as the Egyptian language was in common use, and as long as their kings were of their own nation. But, after the conquest of Egypt by the Persians, and especially by *Alexander the Great*, and the Grecians introduced their language, with their government, the name of Pharaoh ceased among them.

The first Pharaoh, known to us, is the person in whose time *Abraham* went down into Egypt (*Gen. xii. 10, &c.*), A.M. 2084, B.C. 1919. The second Pharaoh, noticed in scripture, reigned in Egypt in the time of *Joseph*. The third Pharaoh is he who persecuted the Israelites. The fourth was probably the Pharaoh before whom *Moses* appeared, and in whose sight he smote Egypt with plagues. This Pharaoh was drowned in the Red sea. The fifth Pharaoh, known to us, is he who gave protection to *Hadad*, the king of *Edom* (1 Kings, xi. 15–18.), about A.M. 2960. The sixth is the Pharaoh, who gave his daughter in marriage to *Solomon*. (1 Kings, iii. 1. ix. 16.) The seventh Pharaoh is *Shishak*, who protected *Jeroboam*, and afforded him a refuge against king *Solomon*, his master, (1 Kings, xiv. 25. 2 Chron. xii. 2. 5, &c.) A.M. 3033. The eighth is the Pharaoh, with whom *Hezekiah* made a league against *Sennacherib*, king of *Assyria*, A.M. 3290. The ninth is Pharaoh *Necho*, son of *Psammitichus*, who subdued *Josiah*. The tenth is Pharaoh *Ophrah*, who entered into alliance with *Zedekiah*, king of *Judah*, and attempted to assist him against *Nebuchadnezzar*, king of *Chaldea*. Against this Pharaoh *Ezekiel* pronounced several prophecies, *Ezek. xxix, xxx, xxxi, xxxii*. He is called *Apries* by *Herodotus*. He is also mentioned *Habakkuk ii. 15, 16. H. xix. xx. Jerem. xlvi. 17. Calmet on the Bible*.

**PHARAON**, the denomination of a game of chance. The principal rules of this game are, that the banker holds a pack of fifty-two cards; that he draws all the cards one after the other, and lays them down at his right and left hand alternately; that the *ponte* may at his choice set one or more stakes upon one or more cards, either before the banker has begun to draw the cards, or after he has drawn any number of couples; that the banker wins the stake of the *ponte*, when the card of the *ponte* comes out in an odd place on his right hand, but loses as much to the *ponte* when it comes out in an even place on his left hand; that the banker wins half the *ponte's* stake, when it happens to be twice in one couple; that when the card of the *ponte* being but once in the stock, happens to be the last, the *ponte* neither wins nor loses; and that the card of the *ponte* being but twice in the stock, and the last couple containing his card twice, he then loses his whole stake. *M. De Moivre*

Moivre has shewn how to find the gain of the banker in any circumstance of cards remaining in the stock, and of the number of times that the ponte's cards is contained in it. Of this problem he enumerates four cases; *i. e.* when the ponte's card is once, twice, three, or four times in the

stock. In the first case, the gain of the banker is  $\frac{1}{n}$ ,  $n$  being the number of cards in the stock. In the second case,

his gain is  $\frac{n-2 \times y}{n \times n-1} + \frac{2}{n \times n-1}$ , or  $\frac{\frac{1}{2}n+1}{n \times n-1}$ , suppos-

ing  $y = \frac{1}{2}$ . In the third case, his gain is  $\frac{3y}{2 \times n-1}$ , or

$\frac{3}{4 \times n-1}$ , supposing  $y = \frac{1}{2}$ . In the fourth case, the gain

of the banker, or the loss of the ponte, is  $\frac{2n-5}{n-1 \times n-3}y$ ,

or  $\frac{2n-5}{2 \times n-1 \times n-3}$ , supposing  $y = \frac{1}{2}$ . M. De Moivre

has calculated a table, exhibiting this gain or loss, for any particular circumstance of the play; and he observes, that at this play, the least disadvantage of the ponte, under the same circumstances of cards remaining in the stock, is when the card of the ponte is but twice in it, the next greater when three times, the next when once, and the greatest when four times. He has also demonstrated, that the whole gain *per cent.* of the banker, upon all the money that is adventured at this game, is *2l. 19s. 10d.* De Moivre's Doctrine of Chances, p. 77, &c. p. 105, &c. See BASSETTE.

PHARASTIA, in *Ancient Geography*, a town of Asia, in the interior of Media, between Phasaba and Curia, according to Ptolemy.

PHARATHA, a town which was situated in the interior of Arabia Felix. Ptol.

PHARATHOU, or PHARATUS, a town of Palestine, in the tribe of Ephraim.

PHARAZANA, a town placed by Ptolemy in Drangiana.

PHARBÆTHUS, a town of Egypt, and capital of the Pharbæithes nome. Ptol.

PHARGA, a town of Arabia Deserta, near the Euphrates. Ptol.

PHARI, among the *Ancients*, a kind of candlestick. See BRANCH.

PHARICUM, the name of a famous poison among the ancients: it was said to be composed of many ingredients, but we know nothing of it at this time.

PHARIGIUM, in *Ancient Geography*, a promontory of Greece, in the Phocide, between Marathon and the foot of Mychus.

PHARINGOTOMUS, in *Surgery*, from  $\varphi\alpha\rho\gamma\iota\zeta$ , the throat, and  $\tau\omicron\mu\eta$ , an incision, an instrument for scarifying the tonsils, on opening abscesses about the fauces.

PHARIS, in *Ancient Geography*, a small town of the Peloponnesus, in Laconia, according to Pausanias, who says that it was situated near the river Phellia, on the route from Amyclæa to mount Taygetes. From his time its ruins only have been seen.

PHARISEES, a celebrated sect among the ancient Jews: so called, as some say, because separated from the rest by the austerity of their life, and by their professing a greater degree of holiness, and a more religious observation of the law.

This is the import of the word פְּרִישִׁי, in the Hebrew, or rather Chaldee tongue; whence is formed the Greek  $\varphi\alpha\rho\iota\sigma\alpha\iota\omicron\varsigma$ , and the Latin *Phariseus*. St. Jerom, and several of the rabbins, maintain this etymology; which is very agreeable to the state and character of the Pharisees; who were not only distinguished from the rest by their manner of life, but by their habit. However, others, with less probability, have derived the name from פָּרַשׁ, *expofuit*, because the Pharisees were in the highest reputation for expounding the law.

It is very difficult to fix the precise origin of the Pharisees. The Jesuit Serrarius places their first rise about the time of Esdras, because it was then that the Jews first began to have interpreters of their traditions. Maldonat, on the other hand, will not have this sect to have arisen among the Jews till a little before the time of Christ. Others, perhaps with more probability, refer the origin of the Pharisees to the time of the Maccabees.

Dr. Lightfoot thinks, that Pharisaism rose up gradually, from a period which he does not assign, to the maturity of a sect. It is certain, from the account given by Josephus, that in the time of John Hyrcanus, the high-priest and prince of the Asmonean line, about a hundred and eight years before Christ, the sect was not only formed, but made a considerable figure; and that it had advanced to a high degree of popularity and power about eighty years before Christ. Calmet places their origin about A.M. 3820, B.C. 184. *Jof. Ant. lib. xiii. cap. 10. §. 5, 6. cap. 15. §. 5. and cap. 16. §. 1.* According to Bafnage, *Hist. of the Jews*, book ii. cap. 9. §. 2, one Aristobulus, an Alexandrian Jew, and a Peripatetic philosopher, who flourished about a hundred and twenty-five years before Christ, and wrote some allegorical commentaries on the Scripture, was the author of those traditions, by an adherence to which the Pharisees were principally distinguished from other sects.

Be this as it will, Pharisaism is still the prevailing doctrine in the Jewish religion; that vast number of traditions in the Talmud, which bear so great a sway among the Jews, coming all from the Pharisees, which they ascribed to God, and received as of equal authority with the sacred writings. See MISCHNA.

Josephus, who describes their dogmata, says, that they attributed all to destiny, and to God; so, however, as not to deprive man of his free agency, which Sixtus of Sienna thus explains: the Pharisees believed, that all things were done by destiny, *i. e.* with God's foreknowledge, and in consequence of his immutable decree; the will of man still remaining free and unaffected: "Fato, hoc est, Dei præscientia, & immobili decreto, omnia geri; manente tamen libero humanæ libertatis assensu."

They owned the immortality of the soul, a resurrection, and a future state; but they admitted, at the same time, as some have supposed, a kind of metempsychosis, or transmigration of souls. They also held the doctrine of angels, and separate human spirits. They were also much addicted to astrology.

The Pharisees were great sticklers for the allegorical or mystical sense of the Scriptures; whence most of the converts made to Christianity among the Jews were of the number of the Pharisees.

In effect, the Pharisees were in every thing directly opposite to the *Sadducees*; which see.

PHARIUM, in *Ancient Geography*, a town of Asia, in Cilicia. Suidas and Xenophon.

PHARKOVA, in *Geography*, a town of Russia, in the government

government of Tobolsk, on the Niznei Tunguska. N. lat. 61 35'. E. long. 106 54'.

**PHARMACEUTICA**, Φαρμακωτικη, that part of physic which directs the preparation and application of medicines. See **PHARMACY**.

**PHARMACI**, Φαρμακισται, among the Greeks, an appellation used for two persons who were employed in the lustration or purification of cities.

These were two men, according to some; but others suppose them to have been a man and woman, to represent the male and female sex, for each of which they offered a sacrifice. It was usual for the man to carry about his neck figs, called ισχιδει, of a blackish colour; and the woman such as were white. Pott. *Archæol. Græc.* tom. i. p. 400, seq.

**PHARMACIA**, Φαρμακεια, in *Antiquity*, denotes the art of effecting strange and wonderful things, by means of medicated and enchanted compositions of herbs, minerals, &c. These things themselves were called *pharmaca*, some of which, being taken inwardly, were said to cause blindness, madness, love, &c. Such were the medicaments by which Circe transformed Ulysses' soldiers: others infected by touch; such was the garment Medea sent to Creusa: others spread their venom afar off, and operated upon persons at a great distance.

There were also *pharmaca foteria*, Φαρμακα σωτηρια, which were amulets against the former: such was the herb moly, which preserved Ulysses from Circe's enchantments; the laurel, the fallow-tree, the rhamnus or Christ-thorn, flea-bane, the jasper-stone, and many others mentioned by Albertus Magnus, and Orpheus, in his book *De Lapillis*. Pott. *Archæol. Græc.* lib. ii. cap. 18. tom. i. p. 353. See **AMULET**.

**PHARMACITIS TERRA**, in the *Materia Medica*, a name which some authors have given to the common ampeletes, or cannel-coal.

**PHARMACIUS SINUS**, in *Ancient Geography*, a gulf of Thrace, on the Bosphorus of the same name, south-west of the gulf Bitycolpas. A considerable river ran into this gulf.

**PHARMACOCHEMIA**, a term used to express that part of the chemical art which treats of the preparation of medicines.

It is thus called by way of distinction from that chemistry which is wholly employed about the transmutation of metals by means of the philosopher's stone; this being called *spagirico-chemia*.

**PHARMACOLOGY**, a treatise of medicines, or the art of preparing them, judging of them, &c.

**PHARMACOPŒIA**, formed from Φαρμακω, *remedy*, and ποιη, *to make*, a dispensatory, or a treatise describing the preparations of the several kinds of medicines, with their uses, manner of application, &c.

We have various pharmacopœias; as those of Bauderon, Quercetan, Zwelfer, Charas, Bates, Salmon, Lemery, Qumey, &c. The latest, and most in esteem, are the Edinburgh, London, and Dublin Dispensatories.

**PHARMACOPOLA**, or **PHARMACOPŒIUS**, an apothecary, or a person who prepares and sells medicines. See **APOTHECARY**.

The word is seldom used but by way of ridicule. It is formed from Φαρμακω, and πωλη, *to sell*. See Horace, *Satire 2. lib. i. vers. 1.*

**PHARMACUM**, Φαρμακον, a medicament, or medicine; whether of salutary, or poisonous quality.

**PHARMACUSA**, in *Ancient Geography*, an island of the Ægean sea.—Also, the name of two small isles, situated

near that of Salamina; in the largest of which, according to Strabo, was seen the tomb of Circe.

**PHARMACY**, Φαρμακεια, derived from Φαρμακω, *remedy*, that branch of medicine, which teaches the choice, preparation, and mixture of medicines.

Most of the natural bodies being some way or other employed as subjects of pharmacy, the materia medica is extremely large, and its operations various. Its materials in the earliest ages, indeed, were very few, and the ways of managing them very simple: subjects afterwards multiplied, operations increased, and at present we seem abundantly stocked with both simple and compound medicines.

Diseases must have been very early, if the first inhabitants of the earth experienced the same changes of seasons, breathed the same kind of air, and used a like kind of diet and regimen of life with ourselves: but soon after the disease afflicts, the patient seeks a remedy; and this appears to have been the foundation of pharmacy in different parts of the world.

Experiments being thus multiplied, and the preparations of simples better made, pharmacy became at length an art. Hippocrates, however, when he came to compile a kind of system of physic from the observations of antiquity, described but few, and those generally simple.

Succeeding physicians then enlarged the *materia medica*; which see. Galen considerably swelled the catalogue, and the Arabians much more; and when learning began to revive in Europe, the materia medica was again enlarged, and great changes wrought upon it by chemistry.

The art of pharmacy must be considered under the management of physicians, apothecaries, trading chemists, and druggists. To the physician it belongs to direct the medicines, and to give the rules of extracting and managing the simples. To the apothecary belongs the reduction of the materia medica into certain forms of medicines, according to the direction of the physician. And the design of trading chemists, and druggists, is to furnish medicinal matters to the apothecary, who cannot always detect an artificial counterfeit, or a dexterous sophistication; and perhaps many remedies, well designed by the physician, have failed, or had mischievous effects on this account. Shaw's *Lectures*, p. 195.

Pharmacy has been divided (without any sufficient reason) into Galenic and chemical.

**PHARMACY**, *Galenical*, called also simply *pharmacy*, is that derived to us from the ancients; consisting in the knowledge and management of the several parts of the materia medica, now in the hands of the apothecaries. See **GALENIC**.

**PHARMACY**, *Chemical*, called also *spagirical* and *hermetical*, is that introduced by Paracelsus, who calls it *ars distillatoria*; consisting in the resolving of mixed bodies into their component parts, in order to separate the useless and ill, and collect and exalt the good. See **CHEMISTRY**.

Under the direction of modern chemistry and medical skill, the state of modern pharmacy has been much improved. The pharmaceutical apparatus consists of furnaces, baths, and a variety of vessels made of glass, &c. For the weights and measures, we refer to these articles. The operations of pharmacy are solution, extraction, depuration, crystallization, precipitation, distillation, sublimation, expression, exciccation, fusion, calcination, &c. For the preparation of different articles, we refer to the terms that denominate them.

**PHARMACY**, *Characters in*. See **CHARACTER**.

**PHARMUTHI**, in the *Egyptian Chronology*, one of the months

months of their year, which answered to the month of April among the Romans.

**PHARNACEUM**, in *Botany*, a name taken from Pliny, said to have been given to some plant in honour of its discoverer Pharnaces, son of Mithridates, king of Pontus. But what the ancient *Pharnaceum* was, though its dried root is reported to have improved the flavour of wine, commentators have conjectured in vain. We may venture to assert it has nothing to do with the present Linnæan genus; nor can we guess at the motive for its application to a set of plants, almost destitute of any sensible qualities, and of too trivial an aspect to have attracted notice, except from the curious enquirers of modern time. Linn. Gen. 150. Schreb. 202. Willd. Sp. Pl. v. 1. 1507. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 2. 173. Juss. 300. Lamarec Illustr. t. 214. Gertn. t. 130.—Class and order, *Pentandria Trigynia*. Nat. Ord. *Caryophyllei*, Linn. Juss.

**Gen. Ch.** Cal. Perianth of five, nearly ovate, concave, spreading, equal, permanent leaves, coloured withinside, thin-edged. **Cor.** none; hence the coloured thin-edged calyx. **Stam.** Filaments five, awl-shaped, the length of the calyx; anthers cloven at the base. **Pist.** Germen superior, ovate, triangular; styles three, thread-shaped, the length of the stamens; stigmas obtuse. **Peric.** Capsule ovate, slightly triangular, invested by the closed calyx, of three cells and three valves. **Seeds** numerous, polished, orbicular, depressed, furrowed by an acute border.

**Obs.** Reichard remarks that the parts of fructification in *Ph. Mollugo* differ somewhat from the above account. This remark is suggested by the description in Linn. Mant. 561, which belongs to *Mollugo Spergula*, see **MOLLUGO**; but we find the flowers are variable on the same individuals. We have already indicated the close affinity between these genera.

**Ess. Ch.** Calyx of five leaves, coloured internally. Corolla none. Capsule superior, of three cells, with many seeds.

The four species defined in Sp. Pl. ed. 2, have subsequently been augmented, chiefly by discoveries at the Cape of Good Hope, to 14, as may be seen in Willdenow. Their habit is for the most part slender, like a *Spergula* or *Arenaria*; in some cases herbaceous and annual, in others shrubby; but always of humble stature. **Leaves** simple, entire, smoothish, variously disposed; their *stipulas* sometimes very remarkable for a shining membranous aspect, and curious subdivision. **Inflorescence** mostly forked, panicled. **Flowers** copious, variegated with green and white, or a reddish tint.

1. *Ph. Cerviana*. Umbellate Pharnaceum. Linn. Sp. Pl. 388. Willd. n. 1. Ait. n. 1. (Pl. umbellis simplicifimis; Gmel. Sib. v. 3. 102. t. 20. f. 2. Alfine; Pluk. Phyt. t. 332. f. 1.)—Flower-stalks lateral, somewhat umbellate, about as long as the linear whorled leaves.—Native of Russia, Siberia, Spain, Guinea and the East Indies. The root is small and annual. **Herb** smooth. **Stems** numerous, spreading in every direction, thread-shaped, yellowish, three or four inches long, simple or divided. **Leaves** about ten in each whorl, linear, glaucous, an inch long, more or less. **Umbels** of two or three greenish-white flowers, on capillary stalks bent toward one side. Minuart, a Spanish botanist, is cited by Linnæus as having written a monograph on this species, under the name of *Cerviana*, but we have never been able to discover any such work.

2. *Ph. Mollugo*. Bedstraw Pharnaceum. Linn. Sp. Pl. 389. Mant. 562, but not 561. (Ph. glomeratum; Linn. Suppl. 185. Thunb. Prodr. 53. Willd. n. 7. Alfine procumbens, gallii facie africana; Herm. Lugd.-Bat. 19.

t. 21. *Rubia stellaris* five *Asperula minor* humifparfa, flosculis albis æthiopica; Pluk. Mant. 163. *Mollugo* n. 1.; Linn. Hort. Cliff. 28.)—Flower-stalks axillary, single-flowered, half the length of the linear whorled leaves.—Native of the Cape of Good Hope. The root is annual. **Stems** numerous, prostrate, alternately branched, zigzag, round, jointed, whitish, very smooth and polished. **Leaves** six or seven in a whorl at each joint, spreading, about half an inch long, linear, entire, smooth, light green, each tipped with a small bristly point. **Flowers** very minute, about the size of a *Herniaria*, green, with white edges, pentandrous, each on a short simple stalk, several together at each whorl; but we find no proper umbel, as described in the *Supplementum*, though we perceive what caused that error.

Great confusion has existed between this plant and the *Mollugo Spergula* of Linnæus, but the above synonyms will not fail to prevent any further mistake. Since the article **MOLLUGO** was published, various specimens from Dr. Rottler have enabled us better to understand the *M. Spergula*, a most variable plant, some of whose flowers answer, as far as we can judge of them dried, to the description in Mant. 561; whilst others, from the same root, are simply triandrous, without either petals or barren filaments, as they ought to be in a *Mollugo*. Linnæus cultivated it in the Upsal garden, and, no doubt, saw there what he has so minutely described, though one of his specimens from thence has simply triandrous flowers. This specimen, moreover, has so nearly lost all the lateral pubescence from the stem, and has its leaves so much elongated, that no one could think it the same with the authentic wild specimen of *M. Spergula*, which we have described in its proper place, did not the various parts of Dr. Rottler's most satisfactorily combine the two. We must observe that *M. Spergula* is the *Pharnaceum Mollugo* of most botanists, they being misled by the wrongly printed specific name in Linn. Mant. 561, which in the margin ought to have been *Spergula*. Willdenow, bewildered by this mistake, has increased it by the mention of *Mollugo verticillata*.

3. *Ph. serpyllifolium*. Thyme-leaved Pharnaceum. Linn. Suppl. 186. Willd. n. 8. Thunb. Prodr. 54.—“Stalks single-flowered. Leaves ovate, stalked.”—From the Cape. A delicate annual herb, resembling a small plant of *Herniaria glabra*. **Stems** branched, forked, thread-shaped, jointed, smooth. **Leaves** two or more at each joint, stalked, ovate, many times shorter than the intermediate spaces. **Stalks** lateral, capillary, the length of the leaves. Linn.

4. *Ph. dichotomum*. Forked Pharnaceum. Linn. Suppl. 186. Willd. n. 12. Thunb. Prodr. 54. Ait. n. 5.—“Stalks axillary, elongated, forked. Leaves whorled, linear.”—From the same country. Willdenow and Aiton mark it annual. We have seen no specimen of this or the last.

5. *Ph. lineare*. Linear-leaved Tawny Pharnaceum. Linn. Suppl. 185. Willd. n. 2. Ait. n. 2. Andr. Repos. t. 326.—Umbels irregular, partly compound, of long terminal stalks. Leaves linear, whorled. Stem prostrate, somewhat shrubby.—Sent from the Cape by Mr. Masson, in 1795, and occasionally introduced since, though often lost, being difficult of preservation. The stem is somewhat shrubby and perennial, and is, according to Mr. Andrews, increased by cuttings. **Leaves**, and whole appearance, much like our English *Spergula arvensis*, but the flowers have a tawny hue, and grow in spurious umbels, some of whose stalks are racemose. The structure of the fructification answers well to the generic character.

6. *Ph. teretifolium*. Thread-leaved Pharnaceum. Thunb. Prodr.

Prodr. 53. Willd. n. 3.—“Umbels lateral. Leaves thread-shaped, pointed. Stem erect, shrubby.”—Gathered by Thunberg at the Cape.

7. *Ph. microphyllum*. Small-leaved Pharnaceum. Linn. Suppl. 185. Willd. n. 4. Thunb. Prodr. 54.—Umbels mostly terminal. Leaves spatulate, clustered, obtuse.—Stipulas woolly.—Found by Thunberg in the same country. *Stem* woody, erect, determinately branched; *branches* very numerous, short, ascending. *Leaves* imperfectly opposite, short, recurved, with dense axillary tufts of smaller ones, all enveloped at the base with white, woolly, crisped stipulas. *Umbels* simple, on stout purplish stalks, which are crowned with a tuft of small leaves and stipulas in a singular manner, and seem therefore an elongation of the stem. *Flowers* few, yellowish, drooping.

8. *Ph. marginatum*. Bordered Pharnaceum. Thunb. Prodr. 54. Willd. n. 5.—“Leaves ovate, bordered, obtuse. Flowers axillary, sessile.”—From the Cape. Thunb. We know nothing more of this species, nor whether Willdenow has rightly placed it next to *microphyllum*.

9. *Ph. quadrangulare*. Quadrangular Pharnaceum. Linn. Suppl. 185. Willd. n. 9.—Panicles dense, leafy, terminal. Leaves lanceolate, thick-edged, closely imbricated in four rows.—Gathered at the Cape of Good Hope by Bledius, who communicated it to Linnæus. This species is extremely rare, and altogether singular for the Heath-like aspect of the innumerable, minute, imbricated leaves on the young branches. *Flowers* greenish, in dense panicles, or clusters, accompanied by shorter ovate leaves. The stem is stout and woody.

10. *Ph. incanum*. Hoary Pharnaceum. Linn. Sp. Pl. 389. Suppl. 186. Willd. n. 10. Ait. n. 4.—Figured in Pluk. Phyt. t. 304. f. 4.—Panicles umbelled, forked, leafy, on very long stalks. Leaves linear. Stipulas in long capillary segments.—Native of Southern Africa. The stem is shrubby, much branched. *Leaves* about an inch long, very narrow, flat, beset with long, white, shining, capillary stipulas, which give the branches a hispid aspect. *Inflorescence* of the same ambiguous kind as we have mentioned under n. 7, but the common stalks are even six inches long; the partial ones repeatedly compound, and of considerable length also. *Flowers* green and white, far more abundant, but smaller than in our specimen from a garden, or in Plukenet's figure.

11. *Ph. albens*. Silver-branched Pharnaceum. Linn. Suppl. 186. Willd. n. 11. Thunb. Prodr. 53.—Panicles somewhat umbelled, forked, on very long stalks. Leaves linear, recurved, pointed. Stipulas minute, fringed.—Gathered at the Cape by Thunberg. Linnæus had specimens from his friend Bæck. — *Stem* shrubby, like the last, but the branches are of an elegant blueish silvery hue, not concealed by the stipulas, which are very small, fringed, and united to the sides of each leaf, at the base. *Leaves* rather above half an inch long, fleshy, glaucous, obtuse, with a small terminal brittle. *Inflorescence* much like the last, but less umbellate, and scarcely leafy, the common stalks four or five inches long, blueish and shining. Willdenow misapplies to this Plukenet's synonym, which belongs to the *incanum*.

12. *Ph. diffichum*. Double-clustered Pharnaceum. Linn. Mant. 221. Willd. n. 13. (*Alfina spergula india orientalis, spicatis floribus ex alis emergentibus*; Pluk. Mant. 9. Phyt. t. 332. f. 4. *A. hololetea villosa, foliis caulem ambientibus*; multiflora; Pluk. Phyt. t. 130. f. 6.) Clusters axillary, zigzag, stalked, in pairs. Leaves linear-lanceolate, downy.—Native of the East Indies. The stem ap-

pears herbaceous. *Leaves* whorled, various in size, downy. Common stalks of the twin clusters longer than the leaves. *Flowers* small.

13. *Ph. cordifolium*. Heart-leaved Pharnaceum. Linn. Sp. Pl. 389. Am. Acad. v. 6. 85. Willd. n. 14. Thunb. Prodr. 54.—Panicles forked, on lateral stalks, much exceeding the inversely heart-shaped, whorled, stalked leaves. Native of the Cape. *Stems* herbaceous, prostrate, branched, a foot or more in length. *Leaves* thick, half an inch wide, smooth. *Stipulas* white, finely fringed. *Inflorescence* and *flowers*, except the want of petals, much like *Spergula arvensis*.

The reader will observe that *Ph. depressum*, Linn. Mant. 562, is *LOEFFLINGIA Indica*; see that article; and seems to be figured in Pluk. Phyt. t. 334. f. 3. S.

PHARNACIUM, in *Ancient Geography*, a town of Asia Minor, in Phrygia.

PHAROS, or ISSA PHAROS, an island of the Adriatic sea, on the coast of Illyria.—Also, a river of Asia, in the environs of Cilicia and the Euphrates.—Also, an island on the coast of Italy, over-against Brundisium, which is said to have been so called from the Pharos, or light-house, erected there for the security of navigation.

PHAROS, *Phare*, a light-house, a pile raised near a port, where a fire is kept burning in the night, to guide and direct vessels near at hand.

The pharos of Alexandria, built in a small island at the mouth of the Nile, was anciently very famous, inasmuch as to communicate its name to all the rest. It was so magnificent a structure, being built by the famed architect Sostrates, a native of Cnidus, or, as some say, by Deiphanes, the father of Sostrates, that it cost Ptolemy Philadelphus eight hundred talents. It had several stories raised one over another, adorned with columns, balustrades, galleries of the finest marble and workmanship, to which, some add, that the architect had contrived to fasten some looking-glasses so artificially against the highest galleries, that one could see in them all the ships that sailed in the sea for a great way; instead of which noble structure, one sees now only a kind of irregular castle, without ditches or outworks of any strength, the whole being accommodated to the inequality of the ground on which it stands, and which it seems is no higher than that which it should command. Out of the midst of this clumsy building rises a tower, which serves for a light-house, but which hath nothing of the beauty and grandeur of the old one. The colossus of Rhodes also served as a pharos.

Ozanam says, pharos anciently signified a streight; as the pharos or pharo of Messina. See *LIGHT-HOUSE*.

PHARPAR, or PHARPHAN, in *Ancient Geography*, one of the rivers of Damascus, or rather an arm of the Barrady or Chrysothoas (which see), that waters the city of Damascus, and the adjacent country. 2 Kings, v. 12.

PHARRKIRCHEN, in *Geography*, a town of Bavaria; 24 miles W. of Passau.

PHARSALIA, in the history of *Poetry*, a poem of Lucan, which belongs to the epic class. The subject of this poem bears characters of epic grandeur and dignity, nor does it want unity of object; viz. the triumph of Cæsar over Roman liberty. As it is not brought to a proper close, we have either been deprived by time of the last books, or the author left an incomplete work. Although the subject be abundantly heroic, Dr. Blair points out two defects: the one is, that civil wars, especially when fierce and cruel, like those of the Romans, present too many shocking objects to be fit for epic poetry, and give odious and disgusting views

of human nature. But Lucan's genius seems to delight in savage scenes, and he dwells on them too much. The other defect of Lucan's subject, is its being too near the times in which he lived; because he is thus deprived of the assistance of fiction and machinery, and his work is thus rendered less splendid and amusing. As to characters, Lucan has drawn them with spirit and with force. Although Pompey be his professed hero, he has failed in interesting us much in his favour; he is always eclipsed by the superior abilities of Cæsar. But Cato is Lucan's favourite character; and wherever he introduces him, he appears to rise above himself. His speech, in particular, to Labienus, who urged him to enquire at the oracle of Jupiter Ammon concerning the issue of the war, deserves to be remarked as equal, for moral sublimity, to any that is to be found in all antiquity. In the conduct of the story he has attached himself too much to chronological order, which breaks the thread of the narration; and he is often too digressive.

In the Pharsalia, the reader will perceive several very poetical and spirited descriptions: nevertheless, the author's chief strength does not lie in narration or description; his narration is often dry and harsh, and his descriptions are frequently overwrought, and employed also upon disagreeable objects. His principal merit consists in his sentiments, which are generally noble and striking, and expressed with that glow and ardour of manner, for which he is peculiarly distinguished. Lucan is the most philosophical, and the most public spirited poet of all antiquity (see LUCAN); and he is the only ancient epic poet, who was really and deeply interested by the subject of his poem. Hence he abounds in exclamation and apostrophes, almost always well timed, and supported with a vivacity and fire highly honourable to him. But he is apt to exceed due bounds, carrying every thing to an extreme, and not knowing where to stop. Attempting to aggrandize his objects, he becomes tumid and unnatural; and when the second line of his descriptions is sublime, the third, in which he meant to rise still higher, is bombast. Upon the whole, his sentiments are so high, and his fire occasionally so great, as to atone for many of his defects; and passages may be produced from him which are inferior to none in any poet whatever. The characters which he draws, *e. g.* of Pompey and Cæsar, in the first book, are masterly, and the comparison of Pompey to the aged decaying oak, is highly poetical. But judging of the whole execution of his poem, Dr. Blair pronounces, that his poetical fire was not always under the government of either sound judgment or correct taste. In his style there is abundance of force, blended with harshness and obscurity, from a desire of expressing himself in a pointed and unusual manner. Compared with Virgil, he may be allowed to have more fire and higher sentiments; but in every thing else, particularly in purity, elegance, and tenderness, he falls infinitely below him. Blair's Lectures, vol. iii.

PHARSALUS, in *Ancient Geography*, a town of Thesaly, upon the Enipeus, S.W. of Larissa, famous on account of the battle fought on a plain near it, in which Pompey was completely defeated by Cæsar.

PHARSANG, or PARASANG. See PARASANG.

PHARUS, in *Botany*, supposed to be so called from *Φαρος*; a cloak; or outer covering; but whether this idea applies to the large wrapping glume of the female flower, as we are inclined to believe; or, as a late French writer, de Theis, asserts, on the alleged authority of Browne, to the economical use which the negroes in Jamaica make of the broad leaves of this grass, must remain doubtful. We find no such account in our original edition of Browne; either in the proper page, or at p. 333, cited by de Theis. Linn.

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Gen. 492. Schreb. 639. Willd. Sp. Pl. v. 4. 396. Mart. Mill. Dict. v. 3. Browne Jam. 344. Ait. Hort. Kew. v. 5. 278. Jusl. 33. Lamarek Illustr. t. 769.—Class and order, *Monocotyledonæ Hexandria*. Nat. Ord. *Gramina*.

Gen. Ch. Male flowers stalked, *Cal.* Glume single-flowered, of two ovate, membranous, coloured valves; the outermost short, rather acute; the inner twice as long, rounded at the end. *Cor.* Glume longer than the calyx, of two equal, oblong, membranous, coloured valves; the outer are sharpish, keeled below the point; the inner emarginate. *Stam.* Filaments six, very short, erect; anthers linear, cloven at each end, the length of the corolla.

Female flowers larger, sessile in the same panicle, *Cal.* Glume single-flowered, of two lanceolate, membranous, sharpish, ribbed, nearly equal valves. *Cor.* Glume rather longer, of two valves; the outer nearly cylindrical, rigid, densely downy, with an acute triangular point, keeled at the back, bent backwards, and shaved off at the base; the inner linear, very narrow, as long as the other, membranous, its margins folded together, both the prominent edges thickened and downy, the apex cloven. *Pist.* Germen superior, linear; style simple; stigmas three, capillary, downy, projecting from the outer glume of the corolla. *Peric.* none; the outer glume of the corolla enlarged invests the seed, being all over mucicated with little soft adhesive hooks. *Seed* oblong, large, with a furrow along one side.

Obf. The above is the improved description of Schreber, who was not able to discover any nectary.

Ess. Ch. Male, Calyx a glume of two valves, single-flowered. Corolla a glume of two valves.

Female, Calyx as in the male. Corolla a glume of two valves, long, involving the solitary seed. Style simple; stigmas three.

1. *Ph. latifolius*. Broad-leaved Pharus, or Wild Jamaica Oat. Linn. Sp. Pl. 1408. Willd. n. 1. Ait. n. 1. (*Ph.* n. 1; Browne Jam. t. 38. f. 3. *Gramen avenaceum sylvaticum, foliis latissimis, locustis longis non aristatis, glumis spadiceis*; Sloane Jam. v. 1. 116. t. 73. f. 2.)—Panicle much branched. Calyx awnless, naked. Leaves obovate, stalked, reversed.—Frequent on the woody hills of Jamaica, according to Browne and Sloane, who both mention it as a remarkably good and nourishing food for cattle. From an expression of the latter, that it is as good for this purpose as oats, we presume the seeds are the part used, though this is not intelligibly expressed. The broad leaves are harsh and coarse, remarkable for being turned upside down, their length about four inches, and the footstalk as much. *Root* perennial, of many strong fibres. *Stem* simple, a foot high, or more, leafy. *Panicle* erect, or rather spreading, purplish, of numerous upright flowers, alternately spiked. We had specimens from the Hon. Mrs. Barrington's stove in 1791.

2. *Ph. ciliatus*. Fringed Pharus. Retz. Obf. fasc. 5. 23. Willd. n. 2.—“Panicle slightly branched. Calyx awnless, fringed. Corolla wanting. Leaves linear.”—Gathered about the margins of pools in the East Indies, by Koenig, who sent it to Retzius. *Stems* two feet high; clothed with numerous, linear, narrow, rough leaves. *Panicle* short, sometimes a simple cluster. *Calyx-valves* ovate, convolute, with two furrows at the back, no awns, and no corolla. Retz.

3. *Ph. aristatus*. Awned Floating Pharus. Retz. ibid. Willd. n. 3.—Panicle umbellate. Calyx awned. Corolla wanting. Leaves ovate.—Native of ponds in the East Indies, where this grass was gathered by Koenig, from whom we have it. The long leafy stems float on the water, sending down abundance of tufted finely branched roots. *Leaves* short, broad, ovate-oblong, obtuse, with long tumid

*sheaths*. *Panicles* short, forming a terminal umbel. The ribs of the *calyx* are all finely fringed in our specimens, as Retzius describes them; yet he calls the *calyx* naked in his specific character.

We readily agree with Mr. Brown, Prodr. Nov. Holl. v. 1. 211, that these two last species do not properly belong to *Pharus*, but are more akin to *Zizania*, or rather, constitute perhaps a new genus. See LEPTASPIS for a more genuine *Pharus* or two.

PHARUSII, in *Ancient Geography*, a people of Africa, in the interior of Mauritania Cæsariensis; N. of the Melangetulians and of mount Sagapola.

PHARYCADUM, a town of Macedonia, in the Eltiotide, at the confluence of the rivers Peneus and Curialus. Strabo.

PHARYNGÆUM SAL, a name given by authors to an artificial salt, of use in the quinsey, and cases of the like kind, when the pharynx, or fauces, are incommoded by a discharge of serous or other humours.

It is prepared of cream of tartar and nitre, each an ounce, with half an ounce of burnt alum; all these are to be dissolved in vinegar, and coagulated according to art. This salt mixed with honey, and dissolved in plantain-water, makes an excellent gargle.

PHARYNGEA, ARTERY, in *Anatomy*, a branch of the external carotid. See ARTERY.

PHARYNGEUS, the name given by Douglas to the constrictor muscle of the pharynx.

PHARYNGO-STAPHYLINUS, is Winslow's name for the palato-pharyngæus.

PHARYNX, φαρυγξ, Gr. the large membranous and muscular cavity, placed at the back of the mouth and nose, through which the food passes into the œsophagus, and the air goes to and from the lungs. See DEGLUTITION.

PHASCHIN, in *Geography*, a small island in the Frozen ocean, near the S. coast of Nova Zembla. N. lat. 70° 30'. E. long. 57 24'.

PHASCUM, in *Botany*, an ancient Greek name, φασκον, for some kind of mossy production, adopted by Linnæus for a most distinct and natural genus of *Musci*, properly so called, whose species are in general the most diminutive of their whole natural order. Dillenius comprehended such of them as he had met with, under his *Sphagnum*. Schreber first gave a scientific and critical account of the genus, in a learned dissertation, published at Leipzig in 1770, with two plates, since which the species have been much investigated, and many new ones described by Dickson, Hedwig and others.—Linn. Gen. 562. Schreb. 758. Mart. Mill. Dict. v. 3. Hedw. Fund. v. 2. 85. Sp. Musc. 19. Sm. Fl. Brit. 1149. Turn. Musc. Hib. 1. Swartz. Musc. Succ. 17. Juss. 11. Lamarck Illustr. t. 873. Class and order, *Cryptogamia Musci*. Nat. Ord. *Musci*.

Eff. Ch. Capsule ovate, without any separate lid, deciduous. Veil minute, deciduous.

The minute mosses which compose this genus are generally of the most simple form of growth, with an undivided, short, and sometimes scarcely discernible *stem*, though with several *leaves*, and the *capsule* is, in that case, solitary, either terminal or lateral, sessile or stalked. The *lid* is scarcely discernible from the rest of the *capsule*, even in colour, nor are its limits defined by any distinct separation; the *seeds* therefore escape by an irregular, and seemingly accidental, laceration, at one side, where the lid usually separates in other mosses. The last edition of *Syll. Veg.* contains but five species of *Phascum*, and of that small number no more than two are really such. The *Species Muscorum* of Hedwig describes twelve genuine ones. The *Flora Britannica* however

enumerates seventeen, all natives of Britain, in the discovery of the more minute and curious of which, Mr. Dickson has had a principal share. They occur chiefly on banks and heaths, sometimes in bogs. The annual ones, which are most numerous, keep vegetating through the open weather of winter, often bearing their minute *flowers* in November and January, and ripening fruit in the early spring, at which season several of them compose a fine green turf on exposed gravelly banks, and as the power of the sun prevails, are soon afterwards dried up. Their little *capsules*, innumerable in themselves, and beyond all calculation as to the abundance of their *seeds*, lie hid and undistinguishable among the sandy particles of the soil, till the moisture of declining autumn calls forth a new progeny. Several species are furnished, besides the fibres that draw nourishment from the ground, with very curiously branched and reticulated spreading filaments, extending themselves like a sort of *Conferva*, and throwing up separate buds or plants here and there. Yet it is not certain that even such are all of perennial duration, nor do these jointed filaments seem to take root. They are probably of the nature of roots notwithstanding, declined to imbibe moisture from the surface of the soil, or from the moisture which it exhales, or retains. The latter appears to be more particularly the case with *Phascum stoloniferum*. This grows on naked clay, serving merely to fix the plants, which can probably obtain no nutriment but from these filaments, spreading widely, and collecting from its inhospitable surface, what some trivial decomposition, aided by the moisture of the atmosphere, may afford. America affords a similar species to the last-mentioned, *Ph. cobarens*, Hedw. Sp. Musc. 25. t. 1. f. 1 6. We have however, from Mr. Menzies, a New Holland non-descript *Phascum*, with actually creeping roots. The following examples will give a sufficiently accurate idea of the whole.

*Ph. subulatum*. Awl-leaved Earth-moss. Linn. Sp. Pl. 1570. Hedw. Crypt. v. 1. 93. t. 35. Curt. Lond. fasc. 4. t. 67. Engl. Bot. t. 2177. (*Sphagnum acaulon trichodes*; Dill. Musc. 251. t. 32. f. 10. *Muscus trichoides minor acaulos, capillaceis foliis*; Vaill. Paris. 128. t. 29. f. 4.)—Stem simple. Capsule on a short stalk. Leaves awl-shaped, spreading; dilated at the base; capillary at the point.—Frequent in shady hollows of sandy banks, bearing fruit in March. *Roots* fibrous, annual. *Plants* rather dispersed, forming loose velvet-like patches, of a pleasant green. Each is about a quarter of an inch high; its short *stem* clothed with very short, taper *leaves*, and crowned with a spreading tuft of much longer ones, whose point is very obscurely serrated. At the top stands the little chestnut-coloured oval *capsule*, slightly elevated on a scarcely discernible *stalk*. The *veil* is very short, and at first slender, till it is split open at one side, by the rapid growth of the *fruit*, and soon falls off.

*Ph. strictum*. Upright Earth-moss. Dickson. Crypt. fasc. 4. t. 10. Sm. Fl. Brit. n. 4. Engl. Bot. t. 2093.—Stem scarcely any. Capsule ovate. Leaves awl-shaped, upright, straight, slightly serrated.—A very rare species, found as yet by Mr. Dickson alone, on alpine bogs in Scotland. This is not half the size of the foregoing, and is distinguished by its dark and blackish-green hue, the want of a leafy *stem*, and the straight uprightness of its *foliage*. *Capsule* dark brown when ripe, on a short fruit-stalk, and greatly over-topped by the *leaves*.

*Ph. multicapsulare*. Many-fruited Earth-moss. Sm. Fl. Brit. n. 7. (*Ph. sphaerocarpos*; Abbot. 230. *Ph. crispum*; Swartz Musc. Succ. 17. Engl. Bot. t. 618, but not of Hedwig.)—Caulicent and branched. Stem-leaves alternate;

alternate; floral ones linear-lanceolate, crowded, straight. Capsules numerous.—Discovered by the Rev. Dr. Abbot in cart-ruts in woods about Bedford; but we have received it from no other person except professor Swartz. It is annual, bearing capsules all winter long. The stems are more or less divided into spreading leafy branches, clothed with small alternate leaves, and crowned with a large tuft of large ones, which never curl like those of the real *crispum* of Hedwig, Engl. Bot. t. 1680, for which this was mistaken in *Fl. Brit.*

Ph. *bryoides*. Tall Earth-moss. Dickf. Crypt. fasc. 4. 3. t. 10. f. 3. Sm. Fl. Brit. n. 10. Engl. Bot. t. 1280.—Stem simple. Leaves ovate, hair-pointed, upright. Capsule elliptical, beaked. Fruit-stalk erect, straight, taller than the leaves.—Found by Mr. Dickson in heathy woody places, and by the Rev. Dr. Abbot at Clapham springs, Bedfordshire. It is annual, arriving at perfection in the spring, and distinguished from most of its genus, though easily confounded with several species of other genera, by its elongated fruit-stalk, resembling those of mosses in general. The capsule too has a more elongated beak than most others, but no separate lid.

Ph. *muticum*. Common Dwarf Earth-moss. Schreb. Phasc. 8. t. 1. f. 11—14. Sm. Fl. Brit. n. 14. Engl. Bot. t. 2027. (Ph. *acaulon* β; Linn. Sp. Pl. 1570. Sphagnum *acaulon* bulbiforme minus; Dill. Musc. 252. t. 32. f. 12.)—Stem none. Leaves ovate, concave, closely imbricated, beardless; the upper ones ferrated towards the point. Capsule globose, nearly sessile. We select this as one of the most common species, and yet one that, for a long time, was not well understood. It is indeed among the smallest, as well as the most simple in structure. It covers exposed banks, in the early spring, and is conspicuous for a tawny though shining green hue, whose brilliancy is enhanced by the dew imprisoned in the concave pellucid *foliage*. The roots are fibrous, and so entangled, that they have a creeping appearance; see Engl. Bot.; but we suspect each fructifying portion to be a distinct plant. The want of a terminal hair to the leaves, some of the larger of which have been observed by Mr. J. D. Sowerby to be ferrated or toothed, the more diminutive size of the whole plant, and the absolute want of a stem, distinguish the present species from the equally common *cuspidatum* of Hedwig, Engl. Bot. t. 2025, with which it was confounded by Linnæus, Hudson, and others, under the name of *acaulon*.

Ph. *ferratum*. Serrated Phascum. Schreb. Phasc. 9. t. 2. Sm. Fl. Brit. n. 15. Engl. Bot. t. 460. Dickf. Crypt. fasc. 1. t. 1. f. 1.—Stem none. Shoots spreading, repeatedly branched, capillary, jointed, barren. Leaves lanceolate, acute, ferrated.—Schreber, who discovered this extremely minute species, in rich moist meadows near Leipzig, could not fail to observe the fibrous jointed shoots that always accompany it, but he mistook them for *Byssus*, or rather *Conferva*, *velutina*, Engl. Bot. t. 1556. Mr. Dickson first detected the true nature of these appendages, to which we have adverted above. The root is small, annual, and fibrous, throwing out from its crown a number of such branched filaments; so that several plants, growing near each other, appear seated on a bed of *Conferva*, composed in reality of their own intermingled shoots. Each has no true stem. Four or five lanceolate, strongly ferrated, pellucid leaves rise from the crown of the root, and envelop a nearly sessile, ovate, brown, pointed capsule, whose veil is, above all others, minute and evanescent.

Ph. *stoloniferum*. Branching-rooted Earth-moss. Dickf. Crypt. fasc. 3. 1. t. 7. f. 2. Sm. Fl. Brit. n. 16. Engl. Bot. t. 2106.—Stem creeping, jointed, branched. Shoots

spreading, branched, capillary, jointed, barren. Leaves lanceolate, pointed, toothed.—First discovered by Mr. Edward Forster, near Walthamstow. Mr. G. Don has found the same in Scotland, and Mr. Turner, who considers it as a variety of the last, in Ireland. It grows on naked clay, in damp places, and is distinguished from *ferratum* chiefly or entirely by the truly creeping roots, which do indeed appear to originate from the jointed filaments, above described, taking upon themselves the nature of roots. How far this is possible, we are all too imperfectly acquainted with these minute, though highly curious, productions, to declare with any degree of certainty.

PHASELIS, or PHASÆLIS, in *Ancient Geography*, a town of Palestine, in the tribe of Benjamin, situated N. of the plain of Jericho, upon the banks of the river Carith, three leagues from the Jordan; said to have been built by Herod in honour of his brother Phaselus.

PHASEOLUS, in *Botany*, φασηλος, or φασηλος, of the Greeks; names supposed to allude to the shape of the seed-vessel, which resembles a kind of small boat, known under the same denomination; the Kidney-bean. Linn. Gen. 372. Schreb. 494. Willd. Sp. Pl. v. 3. 1030. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 4. 288. Juss. 356. Lamarck Illustr. t. 610. Gært. t. 150. Class and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminosæ*, Juss.

Gen. Ch. Cal. Perianth inferior, of one leaf, two-lipped; the upper lip emarginate; the lower with three teeth. Cor. papilionaceous; standard heart-shaped, obtuse, emarginate; reclining, reflexed at the sides; wings ovate, the length of the standard, supported by long claws; keel narrow, spirally revolute, contrary to the course of the fun. Stam. Filaments in two distinct sets, one simple, the other in nine divisions, spirally twisted within the keel; anthers ten, simple. Pist. Germen oblong, compressed, downy; style thread-shaped, spirally inflexed, downy in the upper part; stigma obtuse, thickish, villous. Peric. Legume long, straight, coriaceous, obtuse, with an oblique point. Seeds kidney-shaped, oblong, compressed.

Obf. The keel, and organs of impregnation within it, being both spiral, afford the essential mark of the genus; see *DOLICHOS*. The perianth in many species is accompanied by two roundish leaves, termed by Linnæus an external calyx; but surely rather to be deemed bractæas.

Ess. Ch. Keel twisted spirally, along with the stamens and style. Stigma downy.

This genus is rather less numerous in species than its near relation *Dolichos*, but is, like that, divided into two sections, the one composed of climbing, the other of upright plants. The 14th edition of Syst. Veg. contains seventeen species in all; Willdenow has twenty-four, fifteen of which are enumerated in the second edition of Hort. Kew. without the addition of any new ones. Fourteen of Willdenow's are climbers, ten grow erect. They are mostly tropical productions, though some of the annual kinds prove sufficiently hardy in our climate, and are valuable articles of the kitchen garden, as well as very ornamental. We shall particularize some of the principal.

#### Section 1. Stem twining.

Ph. *vulgaris*. Common Kidney-bean, or French bean; Haricot of the French. Linn. Sp. Pl. 1016. cd. 1. 723. Lob. Ic. v. 2. 59. (Ph. *albus*; Ger. Em. 1212. Phasioli; Math. Valgr. v. 1. 388.)—Stem twining. Clusters solitary, shorter than the leaves. Flower-stalks in pairs. Bractæas spreading, larger than the calyx. Legumes pendulous.—Native of the East Indies. Cultivated throughout Europe, either for the sake of its young legumes, which are boiled

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for the table, and so much esteemed as to be thought worth forcing; or especially in France, and the south of Europe, for the ripe beans, not plentifully perfected in more northern countries, but much esteemed where they abound, as an ingredient in soups, and various made dishes. For these uses the variety whose skin is of a pure white is preferred. Others are brown, or variously spotted. There are varieties of this species in the height, or mode of growth, of its twining *stem*. The *root* in all of them is annual. *Leaves* ternate, as in the whole genus, on longish stalks: leaflets nearly smooth, broad-ovate, inclining to square, more or less pointed, entire, veiny; the lateral ones oblique. *Stipulas* oblong; those on the partial stalks narrowest. *Flowers* four or six in each long-stalked axillary cluster, their partial stalks opposite, short. *Corolla* of a pale bluish white. *Legumes* linear, six inches long. Each *flower* is accompanied by a pair of large, rounded, many-ribbed, pale green, spreading *bracteas*, larger than the *calyx*, and not, as in Willdenow and Aiton, smaller. This error is copied from the second edition of Linn. Sp. Pl., the first edition being in this respect more correct. See the following.

*Ph. multiflorus*. Scarlet Kidney-bean. Lamarck Dict. v. 3. 70. Willd. n. 2. Ait. n. 2. (*Ph. coccineus*; Linn. Sp. Pl. ed. 1. 724. Schkuhr Handb. v. 2. 343. t. 199. a. *Stip. Ph. puniceo* flore; Cornut. Canad. 184. t. 185. *Ph. indicus*, flore coccineo; Morif. sect. 2. t. 5. f. 4.)—*Stem* twining. Clusters solitary, about equal to the leaves, many-flowered. Flower-stalks in pairs. *Bracteas* close-pressed, smaller than the calyx. *Legumes* pendulous. The native country of this beautiful species is unknown. Miller, in his 8th edition, is remarkably confused in his account of this genus, and has mislead Lamarck to assert that he gives South America as the country of the Scarlet Bean; whereas that account applies to his *coccineus*, his 6th not 5th sort, a totally different plant, though it is not easy to say what. Linnæus originally distinguished our Scarlet Bean by the name of *coccineus*, which ought to have been retained, though for convenience we have adopted what seems likely to prevail, and which is not exceptionable in itself, the *flowers* of the present being much more numerous in each *cluster* than in the Common Kidney-bean. Their beautiful brilliant scarlet colour causes them to be universally cultivated, nor are the *legumes* of less value for the table than the former; Miller prefers them. The plant however is rather more tender, and perishes at the first frost. Gerard says, p. 1215, that Tradescant introduced this *Phaseolus* into the English gardens. Now it adorns every cottage bower, blooming abundantly from July till late in autumn, but its crop is not abundant. There is a white or pink-flowered variety. As far as we have observed, the small close *bracteas* afford an invariable specific distinction between this and the *vulgaris*; see our remark on that species.

*Ph. inamoenus*. Green-flowered Kidney-bean. Linn. Sp. Pl. 1016. Willd. n. 6. Ait. n. 4. Jacq. Hort. Vind. v. 1. 27. t. 66. (*Ph. n. 2*; Linn. Hort. Cliff. 359.)—*Stem* twining. Standard of the flower revolute, hairy, the colour of the calyx. Leaflets elongated. Linnæus says this was raised from African seeds in Mr. Clifford's garden, where it flowered, we presume in the stove, in Dec. 1736. At Kew it is said to be a hardy annual, flowering in July and August. The oblong-pointed *leaflets* distinguish the plant, and the small *flowers*, with their green revolute *standard*, are peculiar, though by no means ornamental. The *legume* is short and cimeter-shaped. *Seeds* beautifully speckled with red.

*Ph. vexillatus*. Sweet-scented Kidney-bean. Linn. Sp. Pl. 1017. Willd. n. 8. Ait. n. 6. Jacq. Hort. Vind.

v. 2. 46. t. 102. (*Ph. flore odorato, vexillo amplo patulo*; Dill. Elth. 313. t. 234.)—*Stem* twining. Flower-stalks thicker than the footstalks. Flowers crowded. Wings rather falcate; one of them lobed at the base. *Legumes* linear, straight. This species was raised in Sherard's garden at Eltham, from seeds collected near the Havannah. It is annual, flowering in the stove in July and August, but not often met with. The incumbrance of the large rambling plant is scarcely compensated by the beauty, or even fragrance of the *flowers*. Their common *stalks* are a foot long, and remarkably stout. *Legumes* long, narrow, and hairy. The *keel* is obliquely curved, but scarcely spiral; so that, as Linnæus observes, its character is intermediate between *Phaseolus* and *Dolichos*. We should incline to remove the plant to the latter genus.

*Ph. Caracalla*. Snail Kidney-bean. Linn. Sp. Pl. 1017. Willd. n. 13. Ait. n. 10. Andr. Repos. t. 341. (*Ph. indicus, cochleato flore*; Triumph. Obs. 93. t. 95.)—*Stem* twining. Standard and wings, as well as the keel, spiral. The native country of this magnificent species is not clearly determined. We suspect it to be of African origin; at least it is common in all the gardens at Algiers, from whence M. Desfontaines brought us the only flowers we have ever seen; so little was Mr. Andrews aware of the great rarity he was exhibiting to the public in his plate. The plant indeed may often be seen in stoves, but blossoms so rarely, that few persons have patience to allow it the requisite time and space. It was first brought to Italy by the Portuguese, and long most jealously preserved in the Grand Duke's gardens at Florence. In that country it acquired the name of Caracol, which properly belongs to a large snail. The *root* is perennial, and *stem* woody. The *flowers* are produced plentifully, if at all; many together in long, axillary, dense *clusters*. The *buds* are of a pearly whiteness; the *flowers* variegated with purple and buff, large, and very fragrant, but short-lived. Their greatest peculiarity consists in the *petals* being all rolled spirally together.

Section 2. *Stem erect, or nearly so; in one instance decumbent.*

*Ph. trilobus*. Three-lobed Kidney-bean. Ait. n. 12. Willd. n. 16. (*Ph. maderaspatanus, foliis glabris trilobatus, &c.*; Pluk. Phyt. t. 214. f. 3. *Dolichos trilobus*; Linn. Sp. Pl. 1021. Burm. Ind. 160. t. 50. f. 1.)—*Stem* somewhat twining, smooth. Lateral leaflets two-lobed; terminal one three-lobed; lobes ovate. *Stipulas* ovate. *Stalks* three-flowered, much longer than the leaves.—Native of the East Indies, from whence it was procured by sir J. Banks in 1777. It is annual, kept in the stove, and chiefly remarkable for the formal segments of the *leaves*, the *flowers* being small and inconspicuous. *Glycine triloba*, Willd. Sp. Pl. v. 3. 1056, is the same plant.

*Ph. Max*. Hairy-podded Kidney-bean. Linn. Sp. Pl. 1018. Willd. n. 21. Ait. n. 14. (*Cadelium*; Rumph. Amboin. v. 5. 388. t. 140. Mungo, five *Phaseolus orthocaulis*; Hernand. Mexic. 887.)—*Stem* erect, angular, rough with deflexed hairs. *Legumes* drooping, hairy.—Native of the East. The *root* is annual. *Stem* upright, but a little zig-zag, somewhat branched two or three feet high, leafy, angular, densely clothed with rigid deflexed hairs. *Leaves* not much unlike the Common Kidney-bean, but rather hairy, on hairy *stalks*. *Clusters* axillary, hairy, on short *stalks*, each of three or four pale greenish-yellow *flowers*. *Legumes* an inch and a half long, drooping or even pendulous, very hairy, each containing from two to ten roundish-oblong black *seeds*, variegated with brown. These serve for the food of men as well as horses in Turkey, Persia and Arabia, and are called *Max* or *Mex*, a word borrowed from

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from the Arabians. Columna has given a complete account of this plant, with a very good wooden cut, in the work of Hernandez, as above quoted.

Ph. *Mungo*. Hairy-headed Kidney-bean. Linn. Mant. 101. Willd. n. 22. (Ph. *hirsutus flexicaulis*, Mungo affinis e maderaspatan, caule tereti; Pluk. Almag. 290.)—"Stem zigzag, somewhat twining, hairy, round. Legumes capitate, hairy."—Native of the East Indies. Linnæus having raised this in the Upsal garden, found it distinct from the preceding, with which it appears by his manuscripts he had once confounded it. The round stem, more disposed to climb, and the capitate flowers, seated on a smooth, ovate, long-stalked receptacle, are, by his description, sufficient marks of difference. We find no specimen in his herbarium of this species, but it is mentioned in the late Mr. Donn's Cambridge catalogue.

Ph. *capensis*. Trailing Cape Kidney-bean. Thunb. Prodr. 130. Willd. n. 18.—Stem thread-shaped, decumbent. Stalks single-flowered. Leaflets lanceolate.—Gathered at the Cape of Good Hope by Thunberg. The stem is very slender, rough with minute bristles or prickles. Leaflets an inch and a half long, linear-lanceolate, veiny, minutely hispid. *Stipulæ* small, ovate. *Flower-stalks* axillary, thrice as long as the leaves, and thrice as thick as the footstalks, straight, single-flowered, very rough at the top with deflexed rusty bristles, as is the calyx with erect ones. The corolla is purple, large and handsome. Our specimen shews nothing of the proper character of the genus, for which we must rely on Thunberg. In the Banksian herbarium this plant is referred to *Dolichos*. There appears to us much of the character of *Glycine*, the style being actually curved backwards, with the keel, so as nearly to touch the upper lip of the calyx, and the habit of the whole plant accords with that genus better than with either *Dolichos* or *Phaseolus*.

PHASEOLUS, in *Gardening*, contains plants of the climbing, eculent, and flowering kinds, of which the species cultivated is the common kidney-bean (*P. vulgaris*.)

But other species may be cultivated, for the purpose of variety, as flower-plants.

These were formerly called *Sprage beans*, *French beans*, &c.

And the principal sub-varieties of the dwarf, or low-growing sorts, are; the early white dwarf; the early speckled dwarf; the early yellow; the early liver-coloured; the early dun-coloured dwarf; the larger white, or cream-coloured dwarf; the larger black and white speckled dwarf; black-streaked dwarf; the red-speckled dwarf; the speckled amber dwarf; the sparrow-egg dwarf; the Canterbury white dwarf; the Battersea white dwarf; the China speckled dwarf, consisting of black and white speckled, brown and white, red and white, &c. These are of upright dwarf-bushy growth, rarely exceeding fifteen or eighteen inches in height; and seldom throw out runners, except the Canterbury and Battersea sorts, which sometimes send out a few stragglers, but which seldom extend to much distance.

But the first three or four sorts are at present in most esteem for their coming early into bearing; being of smaller growth than the other sorts, they sooner form themselves for blossom and bearing, of course are proper for planting for the earliest crops, and for forcing in hot-beds, &c. As they, however, do not continue long in bearing, they are not so proper for the main crops as the larger dwarf sorts; particularly the black and white speckled, the Canterbury and Battersea kinds, which are all excellent bearers; but the two latter most of all, and the pods are smaller, more numerous, and esteemed the sweetest eating of all the dwarf

kinds whilst young, though the pods of the large white dwarf, and the speckled kind in particular, continue exceedingly good, even when of pretty large size, but superior in the latter, both in a more plentiful longer production, and goodness for eating, being excellent for a principal crop in a family garden; as are also the Battersea and Canterbury sorts, which should not be admitted on the same occasion; and these two varieties are commonly in most esteem for general culture by the market-gardeners for main crops, as being by them considered both the most profitable for bearing, and having a smaller pod, the most saleable in the markets: however, any of the other dwarf sorts are also proper to cultivate occasionally, for variety, both for private and public use.

There is a scarlet bean, which is by some considered as a distinct species, but probably a variety of this, the running or twining stalks of which, if properly supported, rise to the height of twelve or fourteen feet: the leaves are smaller than those of the common garden-bean: the flowers grow in large spikes, and much bigger, and of a deep scarlet colour: the pods are large and rough; and the seeds are purple marked with black, and sometimes pure white.

The principal sub-varieties of these are; the large scarlet climber, which rises with many twining runners upon support, eight or ten to twelve or fifteen feet high, having numerous large clusters of scarlet flowers, succeeded by large, thick, rough, fleshy seed-pods, containing large, thick, purplish beans.

The large white climber, having large clusters of white flowers, large, thick, rough seed-pods, and white seed. These sorts are all alike in respect to their growth, differing only in the colour of their flowers and seed, which is pretty permanent: they are great bearers; and the plants of the same crop continue in bearing from July or August until October; the pods, even when large, boiling exceedingly green, being remarkably tender and well-flavoured.

The large Dutch climber, which rises with twining runners, upon supports, ten or twelve feet high; has numerous clusters of white flowers, succeeded by long, broad, compressed, flat, smooth pods, containing large, oblong, flat, white seed: this is also a very great bearer, but it does not continue near so long in production as the two former climbers; its pods, however, which are very long, smooth, and fleshy, boil exceedingly green, tender, and good: and, of the runner kind, it is a very desirable family bean, inferior to none for sweetness of flavour.

But the following sorts are of a more moderate growth. The Negro runner; the Battersea white runner; and the Canterbury runner; which, though climbers, ramble less, but bear plentifully and continue some time. The pods are smaller, but very tender, and very delicate in eating, while in moderate young growth.

*Method of Culture*.—As these are all plants of the annual tender tribe, they require to be raised every year, in the latter spring and summer months, as from April till June, or later, by different sowings, at the distance of a few weeks, when the danger of frosts is over.

*Culture in the Dwarf kinds*.—In cultivating these sorts, proper kinds should be chosen for the different crops, as for the forward ones, any of the early sorts are proper, but the early white, early speckled, dun, and yellow kinds, are rather the earliest bearers; and for the main crops, any of the larger dwarf kinds, though preference should be given to the speckled, the Battersea, and the Canterbury dwarf kinds, as being all plentiful bearers, and continuing long in successional bearing on the same plants.

These sorts of beans, from their tender nature, seldom

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admit of being sown or planted earlier than April, when the weather is become a little settled; as the seed is not only impatient of cold moisture in the ground, and very subject to rot, but the young plants that happen to come up early are often cut off, or greatly injured, by the morning frosts, or cold cutting winds, that frequently prevail in the beginning of this and the following month. But towards the middle of it, if the weather is fine and dry, some may be ventured in a warm dry situation, and light soil, for the early natural crops; and in the latter end of it, or beginning of the following month, when the weather is suitable, it is proper to begin to put in the first general crops in the open quarters, &c.; and to continue planting some every fortnight or three weeks, until the middle or latter end of July; by which means regular supplies of young kidney-beans may be had for the table or market, from about the middle or latter end of June until the beginning of the autumnal season.

Where, however, it is desired to try them as early as possible in the full ground, some may be put in about the beginning of April, in dry weather, close under a warm wall, or other similar situation, where the soil is dry; and in a fortnight after some more, in a larger proportion. If the first should fail, these sometimes succeed; and if both are attended with success, one will follow the other in bearing; though it is two to one against the success of the first planting. But as only a few should be planted so early, if they fail, it is only the loss of a little labour and seed, as the lame ground will do again; and if they succeed, and produce only a few but a week sooner than common, they will be esteemed a rarity, either for family use or the market.

They all succeed in any common dry soil of the garden; but for the forward crops, a dry light soil should constantly be chosen, rejecting heavy and wet grounds, for in such a soil most of the early planted seed infallibly rot. Likewise for the early crops, it is highly requisite to have a sheltered warm situation, full to the sun: a warm south border is a very proper exposure; but for the main crops, any of the open quarters may be made use of with propriety.

The methods of sowing or planting all the sorts is in shallow drills, from two to three feet asunder, to remain where sown.

For the early crops, take advantage of a dry day; neat drills should be drawn with a hoe from north to south, two feet or thirty inches asunder, and near an inch deep, and to afford a greater chance of success, a drill may be made close along under the wall, where practicable; in these drills the beans should be dropped in rows along the bottoms, only about an inch and a half asunder, as many of this early sowing may fail; covering them evenly with the earth, not more than an inch deep; as when covered too deep at an early period, many are apt to rot, by the cold moist dampness of the earth. As soon as they are covered in, the surface should be lightly raked smooth; when the work is finished. They come up in about twelve days or a fortnight; when they should be managed as directed below; and the plants mostly come into bearing in six or eight weeks afterwards.

For the main crops to be planted afterwards, almost any situation, either in the borders, or an open exposure, may be employed; though an open situation in any of the large quarters is, as has been seen, the most proper. In this case drills should be drawn two feet and a half asunder, and about one inch deep; or, when it is designed to plant rows of favours or cabbage plants between, (as is often practised where necessary to husband the ground to the best advantage, but which should always be avoided if possible,) the drills should be a yard asunder at least; the beans being

dropped in singly along the bottom of each drill, about two or three inches asunder, covering them in evenly afterwards with the earth about an inch deep, and finishing with a light raking to smooth the surface. They mostly come up at this season in ten or twelve days, and sometimes sooner in fine weather; and the plants usually come into plentiful bearing in six or eight weeks afterwards.

In planting out the later general crops, when the weather proves very dry and hot, and the ground of course very dry, it is proper either to soak the beans a few hours in soft water previous to planting; or, instead of this, letting the drills for the reception of the beans be well watered, and planting them immediately as above, covering them in the proper depth. Either of these methods is very advisable in dry weather in the heat of summer; it being necessary at such times to promote the free germination of the seed, in order to bring them up soon and regularly, as they would otherwise rise in a straggling manner.

*General Culture.*—When the plants of all the above crops are come up, they are in general to remain where sown or planted, to yield their produce; though when necessary some may be transplanted, keeping them clean from weeds by occasional hoeing in dry weather; and when the plants are advanced about three or four inches high, hoeing up a little earth to their stems on each side, which will forward their growth and promote their strength; continuing the care of destroying weeds as often as their growth may render it necessary; which is principally all the culture required for these sorts, in the full ground, till they arrive at a bearing state, and their produce is fit to gather; except to the earliest crops on warm sunny borders, in very hot dry weather, when it may be beneficial to give occasional waterings to the plants in the mornings or evenings, especially when in blossom, or fruiting.

In gathering the produce of these sorts of beans, it should always be performed when the pods are quite young, or at least before they become large, and the beans in them attain any considerable size, as they are then tough, stringy, and rank tasted; and in order to continue the plants in bearing as long as possible, the gatherings should be regularly repeated two or three times a week; for by gathering the pods often and clean, as they become fit, the plants blossom more abundantly, and continue fruiting more plentifully, and for a much longer period.

Large quantities of these dwarf kinds are often cultivated in the gardens and fields in the neighbourhood of large towns, for supplying the markets during the latter part of the summer season.

*Culture of early Crops by artificial Heat.*—In order to have these sorts of beans as early as possible, recourse is had to raising them by the aid of heat, in two or three different methods, as by raising the plants in a hot-bed, an inch or two high, and then planting them out into a warm border, by raising and continuing the plants in a hot-bed so as to bear their crops, and by aid of a hot-house.

In the first of these methods, they may be forwarded a fortnight earlier than those sown entirely in the full ground; for this purpose, towards the latter end of March, or early in the following month, a moderate hot-bed should be prepared a foot and a half or two feet in depth of dung, covered either with a frame or hand-glasses, or arched over with hoops or rods, to be covered with mats; earthing the bed with fine, light, rich mould, six inches deep; then having some seed of the early sorts, it should be sown pretty close either all over the surface, an inch or two apart, covering them with earth about half an inch deep, or in small close drills, earthing them over the same depth; or where  
only

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only a few are wanted, they may be sown in large pots at about an inch distance and half a one deep, and the pots plunged into a hot-bed, or placed in a hot-house; and when the plants come up, the pots be removed by degrees into the full air in warm days, to harden the plants for transplantation: and it is a good method to plant a quantity of beans in small pots (thirty-two or forty-eights), three in each pot, plunging the pots in a hot-bed; and when the plants are fit for being transplanted out, they can be readily turned out of the pots with the whole ball of earth about their roots, so as not to feel their removal. But in raising the plants in either of these methods with this view, attention is particularly necessary to inure them gradually to the full air, by taking off the covers of the glasses or mats in all mild weather from those in hot-beds, and only covering them in cold nights; or the pots in the hot-house should be placed abroad in fine days; but as they advance in growth, and the weather becomes warmer, they must be exposed by degrees to the full air, day and night, to harden them properly, previously to their being finally transplanted out. They should also be allowed frequent moderate refreshments of water.

When they have shot out their proper leaves an inch or two broad, and all danger of frosty mornings and other bad weather is apparently over, proceed to plant them out into a warm border, under a wall or other fence, taking them up with their roots as entire as possible, and with as much earth as will hang about them, or with a small ball of earth; and those raised in small pots by threes may also be easily turned out with the whole ball of earth entire: and as to the mode of planting them, those that cannot readily be taken up with balls may be planted by dibble, in a row along close under a south wall, or some in cross rows two feet asunder, forming shallow drills for their reception, in which the plants should be set three or four inches apart; but those with good balls about their roots should be holed in with a trowel; and if some of those for a small early production are also disposed in patches, three plants in each, so as to be covered occasionally in cold nights with hand-glasses, it will be found very beneficial in forwarding their growth. As soon as they are planted, in either method, a moderate watering should be given to settle the earth close about the roots, and repeated in dry weather as there may be occasion, till the plants have taken fresh root in their new situations.

After this they should be kept clean from weeds; and when they are a little advanced in growth, some earth drawn lightly up about their stems; and as the warm season advances, if it prove hot and dry, refreshments of water will greatly forward and strengthen the growth of the plants, and forward their perfection.

In the second method, about the beginning or towards the middle of February, a dung hot-bed should be made, either a small one in which to sow the beans thick for being transplanted, when the plants are about an inch high, into a larger hot-bed, to remain for bearing; or a large one at first, in which to sow the seed and continue the plants to attain perfection, as for one, two, or more three-light frames, about two feet and a half high in dung: and when the great heat and steam are a little abated, the bed should be covered with light, rich, dry mould, six or eight inches thick, for the reception of the seed; then small drills should be drawn from the back to the front of the bed, near an inch deep, and about fifteen or eighteen inches asunder; placing the beans two or three inches apart, and covering them evenly with earth the above depth, then putting on the lights, tilting them behind an inch or two high

daily, to give vent to the steam; and when the plants appear, continuing every day to admit air to them at all opportunities, in proportion to the temperature of the weather and heat of the bed, to prevent their drawing up weak, and promote their strength as they rise in height; bestowing also at this time moderate refreshments of water in sunny days; and when they are two or three inches high, applying a little earth to their shanks; likewise supporting a moderate heat in the bed during the cold weather, by occasional linings of hot dung: and accordingly as the plants advance in growth, and the warm season increases, augmenting gradually the portion of fresh air daily to harden them by degrees, so as almost to be fully exposed occasionally in very warm days, especially when beginning to blossom; but keeping them close on nights; continuing also the care of frequent light waterings, which must be increased in quantity as the plants advance in size, particularly when they are in blossom and in a fruiting state: in their advanced growth if they press much against the glasses of the frame, it is proper to raise it at bottom two or three inches, to give room at top for their free growth, which is necessary to promote a plentiful bloom for furnishing a sufficiently full crop of beans.

In this mode they may be had at as early a period as possible, as in April or early in May; but to have a constant succession of early kidney-beans till crops in the natural ground come in, another crop should be brought forward in hot-beds, as above, three weeks after the first hot-bed is made up.

When frames cannot be afforded for the above purpose, it may be effected in March with occasional coverings of mats; a hot-bed being made about two feet high of dung, earthing it directly six or seven inches thick, sowing the beans as directed above, then arching the bed over with hoops, &c., and covering it every night, and in all bad weather, with mats; but admitting the free air every mild day, gradually hardening the plants as they acquire strength, and giving occasional waterings.

In the third method, early kidney-beans may be obtained with very little trouble at almost any time in winter or spring, by raising them in pots, or long narrow trough-like boxes, about two or three feet long and eight or ten inches broad at top, placing them any where in the lower part of the hot-house; when the plants will succeed.

The proper kinds for this purpose are; the early white, yellow, and dun-coloured dwarfs, the latter being rather a preferable bearer, continuing in longer production; and the speckled dwarf also succeeds very well, and continues long in bearing in this mode of culture.

In respect to the method of management in these cases, any time in winter or early spring, some large pots (sixteen or twenty-fours) or boxes may be filled with light, rich earth, and placed in the hot-house, some being arranged upon the top of the surrounding wall of the bark-bed, and on the top of the front flues towards the upright glasses, and in other similar convenient situations as room may admit, planting in each pot four beans, near an inch deep, or, if boxes, along the middle, in a sort of double row, triangular-ways, about four inches asunder, and the above depth: they soon germinate, and in a few days appear above ground: when they begin to sprout, it is proper to moisten the mould with a little water, which facilitates the protrusion of the plants out of the earth.

Their after-culture is very easy: when they are come up, frequent waterings should be given, as three times a week, as the earth dries very fast. It should always be kept moderately moist, in order that the plants may blossom freely

## PHASEOLUS.

freely and produce a plentiful crop, which is often in as great perfection as in the full ground.

As in the other crops, they should be gathered often; as it is the way to continue the plants long in a bearing state.

A regular succession of early young crops of these beans may be obtained in this way two or three months, by repeated sowings at the interval of about three weeks, so as to have young plants advancing in pots or boxes in two or three different degrees of growth succeeding each other.

Where there is not much stove-room, it may be proper to plant beans for succession crops in small pots (forty-eights), three beans in each; and as these take up but little room, they may be sowed any where close together, or between the other larger pots: the plants will come up and be advancing in growth, so as that when those of the preceding crops are going off, these may be readily turned out of the small pots with the whole ball of earth about their roots, and replanted into large pots, &c. to remain for fruiting, giving water at planting, and frequently afterwards, as above, in the first crop: by this practice a month's growth in the plants may be gained, and a constant succession of beans for the table had.

*Culture in the Climbing Kinds.* These are raised from the seed, by sowing it annually in the later spring and summer months, as in the dwarf sorts. For this purpose, the scarlet runner, and the white sub-variety of it, are the most proper for the general crops, as being not only very great bearers, and continuing in perfection two or three months, but from their pods, when even pretty large, remaining green, fleshy, tender, and well-flavoured. Some of the Dutch runners, and any of the other climbers, may also be cultivated with advantage.

The most proper season to begin planting the main crops of all these sorts is the first or second week in May, if the weather be fine; as being of a delicate nature like the dwarfs, when planted earlier, both the seed and plants are subject to danger from the same causes: however, in a south border, or some similar warm situation and dry soil, a few may be planted in the middle, or towards the latter end of April, to take their chance; but for the general crops, the most successful season for planting is from the above period until the middle or latter end of June, but not later than the beginning of July; but where the scarlet kind and variety are planted principally, one planting in May or beginning of June will come into bearing in July or August, and when the pods are kept gathered clean, according as they are fit for use, the plants continue shooting, blossoming, and bearing abundantly until the end of September, and often until the end of October, or even till destroyed by the cold and frosts; but two plantings of any of the sorts of runners, one in May and the other in June, or early in July, are amply sufficient to furnish a very abundant supply for the whole season of this sort of crop.

All these kinds prosper almost any where in the garden, both in close and open situations; choosing principally a lightish soil, especially for the forward crops: and the richer the ground the better it is for the purpose.

As all the running kinds require support of some kind or other to climb upon, they should be planted either in wide rows for the convenience of placing tall sticks or poles along each row for the runners of the plants to wind themselves round for support, or be planted against some sort of fence or treillage work for the same purpose of training up and supporting the runners. When, however, it is designed to train them up sticks or poles, drills should be drawn four feet, or four and a half, asunder, especially for the larger kinds, and an inch deep, in which the beans should

be dropped three or four inches apart; covering them in evenly with earth, and raking the surface smooth. The beans will sprout in a few days, and come up in less than a fortnight.

When the plants are three or four inches high, a little earth should be drawn with a hoe up to their stems, to strengthen them, and encourage them to send forth strong runners. At this time also all weeds between the rows should be cut up and be removed.

As soon as they begin to push forth their runners, some tall sticks or poles should be placed for them to ascend upon; and as they are placed, conducting the runners towards them, in a direction according to their natural mode of climbing, which is generally to the right, or contrary to the sun's motion: they will thus naturally encircle the sticks or poles, and ascend to their tops, even if ten or fifteen feet high, producing blossoms and fruit from bottom to top.

When it is intended to plant these sorts against fences for support, it should be done in a row close along to the fence; and if against a wall or paling, either placing tall poles, or drawing some strong packthreads from top to bottom at six inches distance; the plants readily twining round them, and supporting themselves to a great height.

In gathering the produce of all these kinds, the same circumstances should be attended to as in the dwarfs—to gather the pods whilst young and tender; and to continue the plants long in full bearing, always gathering the pods clean as they become of a proper size: and they will continue fruiting more abundantly, and in better perfection.

When it is intended to cultivate any of these climbing beans as flowering plants, the scarlet kind and its variety are the best sorts for the purpose. They should be sown as above in any of the compartments of the pleasure-garden, in patches, alternately scarlet and white sort, two or three beans in each patch, about an inch deep; and when the plants are up, and begin to push forth runners, tall poles or branchy sticks should be placed for them to climb upon: they will thus effect a very fine variety all summer, until the autumn.

These kinds of beans are also often employed to run over arbours, and to twine round lines, from the top of tall stakes, and stems of small trees; also to run up along the sides of houses, or against walls, either upon poles, or upon packthread strings, suspended from above, about which they will twine themselves many feet high, bearing abundance of flowers and fruit: they are likewise sometimes trained to form shady walks, by means of sticks or poles arranged along each side, or by support of a sort of treillage-work, ranging some tall stakes five or six feet asunder, railing them along the top with poles or pan-tile laths, or extending strong packthread lines; and from either of which suspending strings to the ground, six or eight inches asunder, fastening them down with pegs: upon these strings the plants will climb and form a close hedge; or they might be occasionally arched over the top in a similar manner, for the runners to extend, and form a vaulted roof and complete shade. Thus, this fine climber may be trained in various ways according to fancy, both for use and ornament; from which those not accommodated with gardens may plant them in pots or boxes, to be placed in court-yards, windows, balconies, &c.

*Saving Seed.*—In order to have perfectly good seed, it is necessary to sow a sufficient quantity in rows on purpose, suffering the whole crop of the plants to remain without gathering any for use: by this means the seed ripens early, and in the highest perfection; which is essentially necessary

for:

for those who design the seed for public supply. In private gardens, and many others, they often, however, after having gathered the prime of the principal crops, leave the latter produce of them to grow for feed; which, although it may be tolerably good, is not always so large, plump, and fine, as in the former method.

When the seed is quite ripe, which is easily known by examining a seed pod, the plants should be pulled up and spread loosely along in rows, or upon any low hedges, &c. turning them occasionally that the beans may dry and harden well; which, when effected, either thrash them out directly, or lay them up in some dry loft or other room till convenient; and when thrashed out and cleared from the rubbish, spread them upon some clear airy floor, or some such place in the dry, to harden perfectly; then they should be put up in bags for next year's use: some think the change of feed of this kind to be of much consequence.

**PHASES**,  $\varphi\alpha\sigma\epsilon\iota\varsigma$ , formed from  $\varphi\alpha\iota\omega\varsigma$ , *I appear*, in *Astronomy*, the several appearances, or quantities of illumination of the moon, Venus, Mercury, and the other planets; or the several manners wherein they appear illuminated by the sun.

The variety of phases in the moon is very remarkable: sometimes she increases, sometimes wanes, sometimes is bent into horns, and again appears like a semicircle; at other times she is gibbous, and presently again resumes a full circular face. For the theory of the lunar phases, see **MOON**.

As to the phases of Venus, the naked eye does not discover any diversity in them; but the telescope does. Copernicus anciently prophesied, that after-ages would find that Venus underwent all the changes of the moon, which prophecy was first fulfilled by Galileo, who, directing his telescope to Venus, observed the phases to emulate those of the moon; being sometimes full, sometimes horned, and sometimes gibbous.

Mercury also does the same; all the difference between these and those of the moon, is, that when these are full, the sun is between them and us; whereas, when the moon is full, we are between her and the sun.

Saturn puzzled the astronomers a long time with his strange variety of phases. Hevelius and others found him, 1. Monospherical. 2. Trispherical. 3. Spherico-ansated. 4. Elliptico-ansated. 5. Spherico-cuspidated. But Huygens shews, that these monstrous phases were principally owing to the imperfections of their telescopes. That great author, assisted by the best telescopes, noted three principal phases; viz. Jan. 16, 1656, he was round; Oct. 13, brachiated; and Decem. 17, 1657, insated. See **SATURN**.

**PHASES of Comets.** See **COMET**.

**PHASES of an Eclipse for any given Time, To determine the.**— Find the moon's place in her visible way for that moment; and thence, as a centre, with the interval of the moon's semidiameter, describe a circle. Find, in like manner, the sun's place in the ecliptic, and thence, with the semidiameter of the sun, describe another circle; the intersection of the two circles shews the phases of the eclipse, the quantity of obscuration, and the position of the cusps or horns. See **ECLIPSE**.

**PHASIANELLUS**, in *Ornithology*, a species of *Tetrao*; which see.

**PHASIANUS**, the *Pheasant*, a genus of birds of the order Gallinæ. The generic character is; bill short and strong; cheeks covered with a smooth, naked skin; legs generally with spurs. Of this genus the females produce many young ones at a brood, and take care of them for some time, leading them abroad, and pointing out food for them. The young are at first clad with a thick soft down. The nests of the whole tribe are formed on the

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ground. There are fifteen species enumerated by Gmelin, besides varieties.

#### Species.

**GALLUS**; Common, or Wild Cock. Comb on the crown and two wattles on the chin compressed; ears naked; tail compressed, erected; feathers of the neck linear, long, membranaceous at the tips. It inhabits, in a wild state, India. The feet are three or four inches long: it is domesticated every where, feeds on grains and worms, which it scratches out of the ground, and shews to the young chickens; it is very courageous, proud, watchful, and falacious (see **COCK**); it claps its wings before it crows; has a piercing sight, and never fails to cry in a peculiar note at the sight of a bird of prey. The hen, if she have plenty of food, will lay nearly through the year. The body, when wild, is less than that of the common cock; the comb is large, indented, shining red; temples, and line from the crest to the eyes, naked, and of a flesh colour; behind the eyes a clay-colour spot, of the shape of a man's nail, and covered with short feathers; the feathers of the rest of the head and neck long, narrow, grey at the base, black in the middle, and tipped with white; the feathers of the upper part of the body greyish, with a white and black streak; breast reddish; greater wing-coverts reddish-chestnut, with transverse black and white streaks; tail-coverts glossy-violet; middle tail-feathers long, falcate; spur large, curved. The female has neither comb nor wattles; the head and neck grey, cheeks and chin whitish; body more dusky, and varied with brown, grey, and rufous. It has no spur.

Of the period when this bird was first introduced into Europe, all researches will not enable us even to presume a conjecture; but it seems to be taken for granted, that the cock is one of the oldest companions of mankind, and that he was among the first who were drawn from the wilds of the forest, to become a partaker of the advantages of society. Although it does not appear at what period this took place, yet it is almost certain that the first accounts we have of the cock is from the Persian history, to which kingdom, according to Buffon, the western parts of the world are certainly indebted for him. Aristophanes calls the cock the Persian bird, and it was known so early in the most savage parts of Europe, that we find the cock was one of the forbidden articles of food among our early ancestors the ancient Britons. The domestic fowl has almost every where banished the wild one; it is still, however, found wild in the Tinian islands, and in many others in the Indian ocean, and in the woods on the coast of Malabar, in his ancient state of independence. In his wild state, his plumage is black and yellow, and his comb and wattles yellow and purple. Among the ancients, at least the Europeans, after this bird's first introduction among them, those whose feathers were of a reddish cast, were considered as invaluable; but those whose plumage was white they considered as unfit for domestic purposes. Aristotle has treated of them as being the least fruitful of the two; the first he calls generous and noble, being remarkable for their fecundity; the other ignoble and useless, on account of their sterility. These distinctions, as Buffon observes, differ widely from our modern experience, the generous *game-cock* (see **COCK**) being by no means so fruitful as the *dung-hill cock*. The varieties of this species are as follow.

1. Crown with a thick downy crest. This is called the *crested cock*.
2. Feet five-toed, two behind. This is the *Dorking cock*.
3. In the *frizzled cock* all the feathers are turned back.
4. The *Persian cock* has neither rump nor tail-feathers.

## PHASIANUS.

5. The *dwarf* cock has its legs very short.

6. The *Bantam-cock*, so called from having been first found at Bantam in India. This variety is not half the size of the common cock, which he somewhat resembles in colour and spirit, for he will attack cats, dogs, or any other animal, totally indifferent as to their size; he has a reddish bill, red eyes, and a curious rose comb on the top of his head; his ears are covered with a tuft of white feathers; his neck and back are clothed with long feathers, intermixed with orange, black, and yellow; his breast and lower part of the belly are black. The hens of this variety differ from the cocks, principally by varying in their colours, but which at all times are more brown and yellow, and less black, than his; they have also but a small red comb on the tops of their heads; their legs, like those of the cock, are feathered down to the toes, and this is one of the chief marks by which the true breed is distinguished.

7. The *rough-legged* cock, another variety, has its legs feathered down to the toes.

8. The *Turkijb* cock is variegated with beautiful colours.

9. The *Paduan* cock is chiefly distinguished by its great size.

10. The *Negro* cock has a crest, the wattles and chin are black.

11. The hen with a tuberos crown is called the *crowned* hen.

12. The *horned* cock has a crowned horn.

13. The *silk* cock has feathers resembling hairs.

**VARIUS**, variegated Pheasant, is black; front red; neck and back glossy-green; tail compressed, ascending, the coverts hanging down on each side. It is less than the common cock, and is probably found in India.

**IGNITUS**; Fire-backed Pheasant. Black, with a steel-blue gloss; the sides are rufous; lower part of the back fiery ferruginous; the two middle tail-feathers yellowish-brown. It inhabits Java, and is the size of a common fowl.

**MOTMOT**; Motmot Pheasant. This species is brown, beneath reddish; the tail is wedged, the lateral feathers rufous. It inhabits Brasil and Guiana, and is eighteen inches long.

**PARRAKA**; Parraka Pheasant. Brown, beneath and crown tawny; tail long, even. It inhabits the thick woods of South America, is twenty-three inches long; and at sunrise it makes a clamour like a cock.

**MEXICANUS**; Courier Pheasant. It is tawny white; tail long, shining-green. It is about eighteen inches long, inhabits New Spain; is slow in flight, but so swift on foot as to outrun the swiftest horses.

**IMPEJANUS**; Impeyan Pheasant. Crested; purple glossy-green, beneath black; feathers of the neck with a changeable lustre of gold, copper, and green; tail entire, rufous. It is larger than a common fowl. It inhabits India; it is not at all a common bird, being brought down from the hills in the northern parts of Hindoostan to Calcutta as a curiosity. The lady of sir Elijah Impey attempted, with a probability of success, to bring over with her some of them to England, but after living on ship-board a few weeks, they caught a disorder from the rest of the poultry, very like the small-pox, and died in consequence. They will bear cold tolerably, but are impatient of heat. The cock was never observed to crow, but had a strong hoarse cackle, not unlike that of a pheasant. It is described and figured by Latham.

**CRISTATUS**; Crested Pheasant. Brown above; beneath reddish-white; vent rufous; head crested; orbits red, naked; tail wedge-shaped, and tipped with yellow; bill and unarm'd legs black; feathers of the crest whitish-brown; beneath

black; feathers from the hind head to the lower part of the neck have a white streak down the middle; coverts of the wings at the tip and edge white, quill-feathers rufous; the tail is ten inches long, and the length of the body about twenty-two inches. It is a native of New Spain, frequents trees, in the neighbourhood of water, feeds on worms, insects, and serpents.

**AFRICANUS**; African Pheasant. The body is of a blue-ash colour, beneath it is white; the head is crested; the two middle tail-feathers at the tip and lateral ones entirely black. It, as its name imports, inhabits Africa, and is about nineteen inches long.

**COLCHICUS**, or common Pheasant. Rufous, head blue; tail wedged; cheeks papillous; bill pale; horn colour; irides yellow; cheeks red, speckled with black; in the old birds wrinkled and pendulous; a greenish-black feathered line from the nostrils to beneath the eyes; rest of the head and neck green-gold, with a gloss of violet and blue; lower part of the neck, breast, back, and rump, shining tawny; quill-feathers brown, with ochreous spots; belly and vent white; tail-feathers eighteen, with transverse black bars; legs dusky, armed with spurs. Female less, varied with brown, grey, rufous, and blackish; cheeks feathered; and, after she has done breeding, puts on the appearance of the male. There are several varieties. This beautiful bird is about nineteen inches long, and weighs from two pounds twelve ounces to three pounds four ounces. It is said to have been brought from the island of Colchis by the Argonauts; is a native of Africa, and very common in almost all the southern parts of the old continent, whence it was originally imported into Great Britain. Pheasants are much attached to the shelter of thickets and woods, where the grass is very long; but they also often breed in clover fields. They form their nests on the ground, and the females lay from twelve to fifteen eggs, which are smaller than those of the domestic hen. The nest is usually composed of a few dry vegetables put carelessly together, and the young follow the mother like chickens, as soon as they break the shell. The parents and their brood remain in the stubble and hedge-rows, if undisturbed, for some time after the corn is ripe. If disturbed, they seek the woods, and only come forth in the mornings and evenings to feed in the stubbles. Though very fond of corn, they are often obliged to content themselves with wild berries and acorns. In confinement, the female neither lays so many eggs, nor hatches and rears her brood with so much care and vigilance as in the fields. In a mew she will very rarely dispose her eggs in a nest, or sit on them at all; and the domestic hen is usually entrusted with the charge of incubation and rearing the young. The wings of the pheasant are very short, and ill adapted for considerable flights. As the cold weather approaches, these birds begin to fly at sunset among the branches of oak trees for roosting during the night; and this they do more frequently as the winter advances, and the trees lose their foliage. The male birds at these times make a noise, which they repeat three or four times, and which the sportsmen call coking. The hens on flying up utter one shrill whistle, and then are silent. Poachers avail themselves of all these notes, and, unless the woods are strictly watched, secure the birds with the greatest certainty. The crowing of the males, which begins in the first week of March, may be heard at a considerable distance. During the breeding season, the cocks will sometimes intermix with the common hen, and produce a hybrid breed. The pheasant does not appear to pair, for the female carefully hides her nest from the male; and where they are in plenty, and food provided for them, the two sexes are said in general not to feed together. In a domestic state they are sometimes

sometimes more or less mixed with white, and sometimes wholly so. A variety with a white ring round the neck, and hence called the ring pheasant, is not uncommon in some parts of England. This species rarely occurs in Scotland. See PHEASANT.

The varieties are

1. The *ringed* pheasant with a white collar.
2. The *variegated* pheasant, which is white varied with rufous.
3. The *white* pheasant, which is white, with a few small black spots on the neck, and rufous ones on the shoulders.
4. The *piebald* pheasant; this is rufous above, varied with brown and whitish; the tail-feathers are black, edged with white.
5. The *Turkey* pheasant, that has naked orbits which are red; the rest of the head is feathered. This inhabits Africa and Asia; is domesticated every where; in breeding time, on each side, above the ears, is a golden feathered tuft like horns.

**ARGUS** Pheasant. Pale yellow, spotted with black; face red; hind head crested, blue; bill yellowish; orbits and whiskers black; front, chin, and throat red; hind-head and nape blue; wings grey, with eye-like spots; tail wedged; the colour of the wings; two middle feathers three feet long, with large eye-spots at the shaft; feet armed; size of a turkey. Inhabits Chinese Tartary and Sumatra. This is a most beautiful bird, though its colours are not brilliant. It is with great difficulty kept alive for any time after it has been caught in the woods. It seems to have an antipathy to the light, being quite inanimate in the open day; but when kept in a dark place, it appears to be perfectly at ease, and sometimes makes its call, which is rather plaintive, and not harsh, like that of the peacock. The flesh resembles that of the common pheasant.

**PICTUS**; Painted Pheasant. Crest yellow; breast scarlet; secondary quill-feathers blue; tail wedged; bill, irides, and armed legs, yellow; feathers of the crest silky, and hanging backwards; cheeks naked and flesh-coloured; feathers of the hind-head tawny, with black lines, and beneath these green ones; back and rump yellow; upper tail-coverts long, narrow, and scarlet; wing-coverts varied with bay and brown; scapulars blue; quill-feathers brown, with yellowish spots; tail-feathers varied bay and black, and twenty-three inches long. Female reddish-brown; yellowish-brown beneath; legs unarmed; less than the common pheasants; length two feet nine inches and a half. The native country of this beautiful species is China, where it is called Kin-ki. It bears confinement well, and will breed readily in that state. The eggs are redder than those of the common pheasant, and somewhat resemble those of the Guinea fowl. An instance of their breeding with the common pheasant is mentioned by Buffon. Edwards informs us, that some females of this species, kept by lady Essex, in the space of six years gradually gained the male feathers; and we are told that it is not unusual for the hen birds, when about four or five years old, to be neglected by the cocks, and gradually to gain the plumage of the males.

**NYCTHEMERUS**; Pencilled Pheasant. This species is white; the crest and belly are black, and the tail wedged. It inhabits China, and is about thirty inches long. Bill and irides are yellow; temples naked, red; head and body beneath purplish-black, above white; the two middle tail-feathers are white; the rest with oblique, black streaks; the legs are red and armed. The female of this species is brown, beneath white, varied with brown, and with transverse black bands; the legs are unarmed.

**SUPERBUS**; Superb Pheasant. Unarmed; rufous, varied

with green and blue; caruncles of the front rounded; wattles fulvate. It is found in divers parts of China. The bill and body are red. On each side the neck are long feathers turned back; the crown is green, the hind part with a folding blue crest; shoulders green, spotted with white; primary quill-feathers blue; tail long, wedged, the feathers are varied with blue and red; coverts declined, of various mixed colours; legs are yellow.

**LEUCOMELANOS**; Coloured Pheasant. Crested, black; feathers of the body edged with white. It inhabits India, and is nearly two feet long. For a method of catching pheasants, see PHEASANT.

**PHASIS**, **PACHE**, in *Ancient Geography*, the name of the most celebrated of the towns which were situated on the river Phasis, according to Strabo. Its position was on the left bank and near the mouth of the river. Mela says, that it was built by Themistagorus, the Milesian. It had a temple of Phryxus, and a grove memorable on account of the fable of the golden fleece.

**PHASIS**, *Nebr Pache*, a river of Asia, which had its source in the mountains of Armenia, and after a long course, in which it was augmented by several streams, and in passing through the Colchide, and dividing it into two almost equal parts, discharged itself into the Euxine sea. Strabo, Pliny, Ptolemy, &c. mention this river. Procopius says, that it was called "Bous," from its source to the extremities of Iberia, where it assumed the name of Phasis, and began to become navigable by large vessels to its mouth. Strabo reports, that Casor and Pollux built upon the banks of the Phasis the town of Tindaris, and according to Eustathius, Jason ascended this river as far as the neighbouring mountains of Armenia.—Also, a river of the island of Taprobana. Ptol.

**PHASMATA**, in *Physiology*, certain appearances arising from the various tinctures of the clouds, by the rays of the heavenly luminaries, especially the sun and moon.

These are infinitely diversified by the different figures and situations of the clouds, and the appulses of the rays of light; and, together with the occasional flashings and shootings of different meteors, they have, no doubt, occasioned those prodigies of armies fighting in the air, &c. of which we have such frequent accounts in most sorts of writers. Vide 2 Maccab. xi. 8. Melancth. Meteor. 2 Shel. de Comet. ann. 1618.

Kircher, and his imitator Schottus, have erroneously endeavoured to explain the phenomenon from the reflection of terrestrial objects made on opaque and congealed clouds in the middle region of the air, which, according to them, have the effect of a mirror. So that, according to these authors, the armies pretended by several historians to have been seen in the skies, were no other than the reflection of the like armies placed on some part of the earth. Vide Hist. Acad. Roy. Scienc. ann 1726, p. 405, & seq.

**PHASSACATES**, in the *Natural History of the Ancients*, the name of a species of agate, which, in its different appearances, they sometimes called also *leucachates* and *perileucos*. It is found in the East Indies, in Bohemia, and some other parts of Europe.

**PHATCZ**, in *Geography*, a town of Russia, in the government of Kursk, on the Ufoza; 40 miles N. of Kursk.

**PHAUSINGES**, a name given by the ancients to red circles on the legs, occasioned by fire: it is by some also extended to several other spots and blemishes on the skin.

**PHAYLOPSIS**, in *Botany*, so named by Willdenow, apparently from *φαυλος*, vile or contemptible, and *οψις*, aspect. Willd. Sp. Pl. v. 3. 342. (*Micranthus*; Wendl. Obf. 38.)

Clafs and order, *Didynamia Angiospermia*. Nat. Ord. *Perfonata*, Linn. *Scrophularia*, Juff.

Eff. Ch. Calyx five-cleft; upper fegment largeft. Corolla ringent; upper lip very fmall, cloven. Capsule pod-fhaped, of one cell, with four feeds.

1. Ph. *parviflora*. Willd. (*Micranthus oppositifolius*; Wendl. Obf. 39.)—Supposed to be a native of India. Root annual. Stem erect, fquare, clothed in the upper part with loog white hairs, furnifhed at its fummit with fmall reddifh granulations. Branches oppofite. Leaves oppofite, on long ftalks, ovate, pointed, flightly toothed, veiny, hairy, running down into the footftalks. Stalks axillary, three-flowered. Calyx covered with glandular hairs, its upper fegment oblong-lanceolate, veiny, the four others fetaceous. Corolla narrow; the lower lip in three deep fegments, twice as long as the upper. Capsule fmallier than the calyx. Willd.

We have feen no authenticated fpecimen, but we doubt not that this plant is to be found among the numerous unfettled fpecies of this natural order, of which drawings have been brought from India by colonel Hardwicke and others, and which from their inconfpicuous appearance and annual duration, have not as yet been thought worthy of introduction to the European ftoves. They indeed conftitute a tribe not a little puzzling to the fcientific botanift. The fruit of the prefent genus indeed appears, by the defcription, very peculiar. We prefume it confifts of two valves, with the feeds inferted, one above another, along one or both edges.

PHAZEMONITIS, in *Ancient Geography*, a country of Afia, in Pontus, which, according to Strabo, extended from the river Amyfus to the Halys.

PHEA, a town of the Peloponnefus, in the Elide.—Alfo, a confiderable river of the Peloponnefus.

PHEANTIDES, in *Natural Hiftory*, a name given by fome to the ftone called *encymonites*; it was of the nature of our fparry incruftations on the roofs of fubterraneous caverns. It was fupposed to have great virtues in promoting delivery, and was given to women when they fell in labour.

PHEASANT, in *Ornithology*. See PHASIANUS.

Pheafants were firft brought into Europe from the banks of the Phafis, a river of Colchis. Martial, lib. xiii. ep. 72.

The pheafant is fo nearly allied to our common poultry, that it would naturally appear a very eafy thing to breed them up from young; but the proper food of them is not fufficiently inquired into. Though they eat corn when full grown and in health, yet they have recourfe, in their younger ftate, and when fick, to another fort of food, preying on feveral infects, and that in a very voracious manner.

The young pheafant and partridges prey upon ants; and they will never fucceed with us, if they have not a proper quantity of ants to have recourfe to, as foon as they leave their roof in a morning. When mufky corn, or want of due care in cleaning their houfes, has made them fick, a repaft of ants will often recover them. When that fails, they may be offered millepedes or ear-wigs, or both together, which will always do much better than either fingly. To this medicine muft be added a proper care that their common food of corn be very fweet, their habitation be kept nicely clean, and their water fhifted twice a day. They muft not be let out of the houfe in a morning, till the dew is off the ground; and after funfet, they muft be immediately taken in again: in the heat of the day, they muft be allowed to bask in the fun in a dry fandy place. With thefe regula-

tions, the birds of this kind will fucceed much better than they ufually do.

The pheafant is a bird of a fullen difpofition; and when the coupling time is over, there are feldom found more than one in a place. Phil. Tranf. N. 23.

The way of taking pheafants is, firft, to be acquainted with their haunts and breeding-places; which are ufually young, thick, and well-grown coppices, free from the difturbances of cattle, and having no path-way through them; for the pheafant is an extremely timorous bird. When the haunts are difcovered, the next thing to be attempted is, to find where the eye or brood is. In order to this, it is to be confidered, that the pheafant comes out of the wood three times a day to feed in green corn, frefh pastures, or the like places. The times of coming out are in the morning foon after fun-rife, at noon, and at fun-fet. The fide of the wood, where they are fupposed to come out, is to be carefully watched on this occafion; and the young ones will be feen following the female, juft as a flock of chickens follow the hen. The wood may be alfo well watched in the evenings, and the noife of the cock and hen, calling the young ones together, will foon be heard; and the fportsman is on this occafion to get as near as he can to the place, and being very ftill and filent, he may obferve their numbers and difpofition, and learn how to fpread his nets fo as to take the whole brood with great eafe; but if his leaft motion, when near them, difcover him, they will all take to their legs, and run to a great diftance: they feldom rife on the wing, except very clofe frightened indeed. Practice will make fome people fo expert at imitating the voice of the old pheafant, that they will be able to call the young ones together to any place that they pleafe, when the haunts are once found out, and by this means they are eafily led into the nets.

The beft time for ufing the call is in the morning or evening; and the note imitated fhould be that by which the old ones call them out to feed; but by learning to imitate the other notes, they will be brought together at any time of the day. The fportsman who can make this call, muft fhelter himfelf in fome clofe place, and begin by very foftly making the note; then, if none are near enough to be with-in hearing, he is to raife it to more and more loudnefs, and at length he will be answered as loud, if any are within hearing, though at a confiderable diftance; whereas, if he fhould fet up the call too loud at firft, and any of the birds fhould happen to be very near, they will be frightened away.

As foon as a pheafant answers, the fportsman is to creep nearer and nearer, ftill calling, though not fo loud; he will ftill be answered, till at length he will be led by the bird's voice within fight of it. As foon as this is the cafe, he is to fpread his net, and then begin to call again, keeping in fome clofe and well-fheltered place behind the net: in this place he is to call till the bird approaches; and when he has drawn it under the net, he is to appear fuddenly, and the bird, rifing up, will be caught in the net.

Another method of taking pheafants, much quicker than by this means, is, the having a live cock pheafant to ufe as a ftale: this bird is to be fixed under the net, and by his crowing he will foon entice others in. The fportsman muft lie concealed; and as foon as another pheafant comes in, he is to draw the net over him. Many people have a method of taking pheafants in fpringes or horfe-hair fnares: the fucceeding in this depends on the carefully fearching out their haunts, and the places by which they go out of the woods into the fields. When thefe are found, a peg is to be fixed in the ground at each, and at each peg two fpringes are to be laid open; the one to take in the legs, the other the head. As foon as the fpringes are fet, the fportsman is

to go into the woods, and getting behind the birds, he is to fright them with some little noise, such as shall not be enough to raise them to the wing, but only to set them a-running. They will naturally make their way out of the wood, through their accustomed passes, and be then caught in the springs.

There is another method of taking these birds in the winter, provided that there is no snow. This is to be done with a net made like a casting net, but with the meshes much wider; they may be five inches wide. Some pease or wheat are to be taken out; and the path of the pheasant being discovered, which may easily be done by their dung, a pint or thereabout of corn is to be thrown down in the path in a place marked, so that the sportsman can come to it again. This is to be done for several days, till at length the pheasants are expecting it every day regularly; and all the birds of this kind that frequent the place, are brought together to feed there, and then the net is to be fixed over the place; its top being tied up to some bough of a tree, and its bottom fixed down all around, except in one place, where the walk of the pheasants lies. In this place it is to be raised in form of an arch, and the entrance is to be lined with several rods of hazel; the thick ends of which are to be tied to the net, and the thin ones let into the space covered by it; and thus the pheasants will easily get in by parting the small ends of the sticks, as fish into a wheel, but they will not easily get out again. The nets are to be dyed of a russet-colour, by laying them in a tan-pit; and they must, when planted for this purpose, be covered with boughs, so that the birds do not discover them, and then they will easily run into them, and be all taken at once.

Pheasants frequently inhabit and infest the grain-fields of the farmer. But, where practicable, they are generally confined in preserved places, as in inclosed woods of the coppice or other kinds; but none, or very few, attempts have hitherto been made to rear this sort of birds in a domestic manner, for their uses in that way: yet it would appear to be a very easy matter, from the great resemblance which they have to poultry in their habits, modes of feeding, and several other particulars, though unquestionably they are much less hardy in their nature. When pheasants become full grown, they are found to be great devourers of most sorts of grains, to the great injury of the farmers who are near their habitations.

They would be a very good bird for the table, if they could be raised with facility in the farm-yard.

**PHEASANT'S EYE**, in Botany. See *Flos ADONIS*.

**PHEASANT'S EYE-PINK**. See *DIANTHUS*.

**PHEASANT'S ISLAND**, or *Island of Conference*, in Geography, an island situated in the river Bidassoa, between France and Spain.

**PHEASANT SEA**, or *Pin-tail Duck*. See *DUCK (Acuta)*.

**PHEASANTRY**, in Ornamental Gardening, a building or place constructed for the purpose of breeding, rearing, and keeping these sorts of birds; and which should constantly be raised near to, and be well covered with plenty of wood, in different states of growth; the whole being inclosed with a high fence, in order that the young may be allowed, as soon as possible, to run freely through it, and pick up their food, as well as other matters.

The buildings of this nature should be formed in a very neat, ornamental manner; sometimes in a square, at other times in an oval or oblong shape, as may be the most suitable to the particular spots on which they are to be erected.

**PHEBALIUM**, in Botany, a name adopted by Ven-

tenat from John Bauhin, who, in his *Hist. Plant.* v. 1. 509, mentions it as applied by some Greek comic poets to the Myrtle, to which Ventenat thought his plant allied. But Bauhin writes the word *Phibaleon*, and nothing can be more unlucky than its application here, the genus of Ventenat, if we mistake not, being one of the *Rutaceæ*, not *Myrti*, and having as little resemblance to a Myrtle as may be. Notwithstanding the elaborate description and figure of this excellent botanist, in his *Jardin de la Malmaison*, we cannot but think he has erred in describing the calyx without any teeth, and that he has totally misunderstood the fruit, which indeed he did not see ripe. We have not however met with his identical species, but we presume on its evident and close affinity to one before us; and on these grounds we venture to attempt a history of the genus; tolerating the name, for its found at least, which considering some others, that we are forced to endure, is no small recommendation. *Vent. Malmaif.* 102.—Class and order, *Decandria Monogynia*. Nat. Ord. *Rutaceæ*, Juss.

**Gen. Ch.** *Cal.* Perianth inferior, of one leaf, with five shallow teeth, permanent. *Cor.* Petals five, equal, elliptic-oblong, concave, entire, nearly sessile. Nectary glandular beneath the germen. *Stam.* Filaments ten, capillary, simple, smooth; anthers terminal, incumbent, of two round lobes. *Pist.* Germens five, erect, pointed; style central, from the base of the germens, erect, thread-shaped; stigma obtuse. *Peric.* Capsules five, combined at the base, spreading, ovate, compressed, of one cell and two valves. *Seeds* solitary, smooth, in an elastic tunic of two valves.

**Eff. Ch.** Calyx five-toothed. Petals five. Stamens capillary, simple. Anthers terminal, simple. Style from the base of the germens. Capsules five, combined, seated on a glandular nectary. Seeds solitary, in an elastic tunic.

1. *Ph. squamulosum*. Scaly Phebalium. *Vent. Malmaif. t. 102.*—Leaves lanceolate, scaly beneath. Umbels terminal, solitary.—Native of the mountains of New South Wales. A greenhouse plant at Paris, flowering in the beginning of summer. *Stem* shrubby, erect, much branched, a yard high. *Leaves* alternate, about an inch long, lanceolate, acute, entire, on short stalks; their upper surface dark green, smooth, dotted; under clothed with minute, whitish scales. *Umbels* at the ends of the branches, solitary, of six or eight small yellowish flowers, whose *stamens* are capillary to the very base, and twice as long as the *petals*. The *style* is rather shorter than the *stamens*. Ventenat did not perceive any teeth or divisions to the *calyx*. The *leaves* when bruised are aromatic. We have seen no specimen.

2. *Ph. dentatum*. Toothed Phebalium.—Leaves linear, toothed, revolute; hoary beneath. Umbels axillary.—Brought by Gen. Grose from some part of New Holland, and communicated to us by A. B. Lambert Esq. A larger shrub, apparently, than the preceding; the *branches* round, hoary with extremely minute starry scales. *Leaves* scattered, about two inches long, on short stalks, linear, bluntnish, revolute, rather distantly toothed; upper side dark shining green, besprinkled with glandular dots; under white or hoary, with a sort of mealy pubescence, not discernibly scaly. *Umbels* about the upper part of the branches, axillary, on dark coloured stalks, much shorter than the leaves, slightly hoary like the branches, each of eight or ten pale yellowish flowers. These in every part answer to Ventenat's description and representation of the last, except that the *calyx* is very manifestly five-cleft. Each *anther* consists of two round, almost separate, lobes, without any appendage. The *stamens* and *style* are twice the length of the *petals*, which are full of large glandular dots, or cells of essential oil, most apparent at the back; but we see nothing like the peltate

peltate scales which are described by Ventenat as covering the backs of the *petals* in his species.

3. *Ph. argenteum*. Silvery-scaled Phebalium. (*Eriostemon squamea*; Labill. Nov. Holl. v. 1. 111. t. 141.)—Leaves lanceolate, entire, naked on both sides. Clusters axillary, compound, scaly.—Our specimen was gathered by Mr. Menzies, near King George's sound, on the west coast of New Holland. Labillardiere found his at the cape of Van Diemen. He speaks of it as a *tree*, from five to seven fathoms high, with spreading *branches*, angular and scaly when young. These scales in our's are scattered, and finely stellated, very like those of a turbot in miniature. *Leaves* two or three inches long, bright green, somewhat coriaceous, lanceolate, flat, entire, about half an inch wide, naked on both sides, except in a very young state, when the back is scaly like the branches. *Footstalks* short. *Flower-stalks* axillary, much shorter than the leaves, racemose, compound, many-flowered, angular, entirely covered, as well as the *calyx*, under side of the *petals*, and the *germens*, with the most beautiful, crowded, convex, snow-white, silvery scales. The upper surface of the *petals* is smooth, naked, and seems to be white. *Stamens* but half the length of the corolla, very slightly dilated at their base, smooth in every part. *Style* shorter than the *stamens*. *Capsules*, according to Labillardiere, five, ovate, slightly compressed, pointed, gibbous at the upper edge where they burst, lined with an elastic cartilaginous tunic to the *seed*, of the same form, and bursting in the same manner. *Seed* solitary, nearly kidney-shaped, black and smooth. This excellent author, fearing lest the genera of the *Rutaceous* family should be too much multiplied, refers this plant to our *ERIOSTEMON*, (see that article); but the *stamens* are too different to admit of such a measure. A most valuable remark is subjoined, that except in number of the parts of fructification, the plant in question agrees with *Melicope* of Forster. We are happy to meet with this confirmation of our conjecture respecting the natural order of that genus, (see *MELICOPE*,) which we had not till now seen in Labillardiere. As to the difference of number, we should not think it of importance in this case. But the ternate *leaves*, general smoothness, deeply divided *calyx*, and oblong arrow-shaped *anthers* of *Melicope*, excite considerable doubts; and if Gærtner be correct, the want of an elastic tunic to its *seeds*, affords a most essential distinction.

**PHECOS**, a name used by some authors for the sagittaria, or water-arrow-head.

**PHEGOROVKA**, in *Geography*, a town of Russia, in the government of Ekaterinoflav, on the Bug; 60 miles N.W. of Cherfon.

**PHEDOSIEVKA**, a town of Russia, in the country of the Cossacks, on the Choper; 44 miles W. of Archedinskaja.

**PHEER-FARRID**, a town of Hindooostan, in Berar; 25 miles E.N.E. of Notchengong.

**PHEGEA**, in *Ancient Geography*, a town of the Peloponnesus, in Arcadia.

**PHEGOS**, a town of Greece, in Theffaly, situated near the place where was an oracle of Jupiter, which was afterwards transferred to Epirus.

**PHEIA**, a town of Triphylia, north-west of Letrini, at the bottom of a small gulf, which had a port and a small island.

**PHELDAHANATZ**, in *Geography*, a town of Russia, in the government of Caucasus; 20 miles S.E. of Kizliar.

**PHELIN**, a town of Russia, in the government of Riga, on the river Phelin; 96 miles N. of Riga. N. lat. 58° 10'. E. long. 25° 14'. The river of this name runs

from lake Vertz into the Baltic, which it enters at Pernov.

**PELLANDRIUM**, in *Botany*, the Water Hemlock, is usually derived from *φελλος*, *cork*, and *ανης, ανδρος*, *a man*; but as such an etymology throws no light on the signification of the word, and is actually without any meaning, may we presume to suggest that the first syllable ought perhaps to be *Phel*, from *φελειω*, *to deceive*, in allusion to the dangerous qualities of the herb, and its resemblance to some that are wholesome? This meaning is strengthened by Pliny's comparing the leaves to *Apium*, for which, if the *Phellandrium* were mistaken, the error would be very dangerous. Linn. Gen. 140. Schreb. 190. Willd. Sp. Pl. v. 1. 1444. Mart. Mill. Dict. v. 3. Sm. Fl. Brit. 321. Ait. Hort. Kew. v. 2. 149. Juss. 221. Tourn. t. 161.—Class and order, *Pentandria Digynia*. Nat. Ord. *Umbelliferae*.

Gen. Ch. *General umbel* of numerous rays; *partial* similar to it. *General involucre* none; *partial* of seven acute leaves, the length of the *partial umbel*. *Perianth* of five teeth, permanent. *Cor.* *Universal* nearly uniform; flowers all fertile; those of the disk smallest; *partial* of five unequal, pointed, inflexed, and so becoming heart-shaped, petals. *Stam.* Filaments five, capillary, longer than the corolla; anthers roundish. *Pist.* Germen inferior, oblong; styles two, awl-shaped, erect, permanent; stigmas obtuse. *Peric.* Fruit ovate, smooth, crowned with the perianth and pistils, separable into two parts. *Seeds* two, ovate, smooth.

Eff. Ch. Flowers all fertile; those of the disk smallest. Fruit ovate, smooth, crowned with the calyx and styles. *General involucre* wanting.

Obs. This genus is certainly nearly allied to *OENANTHE*, (see that article,) to which Lamarek has united it; but the flowers being all fertile, the general involucre wanting, and the coat of the seeds, though smooth and even, not tumid or corky, may keep it distinct. In habit and economy, as well as in qualities, the first species, at least, agrees with *Oenante*. Crantz refers *Phellandrium* to *Ligusticum*.

1. *Ph. aquaticum*. Common Water Hemlock. Linn. Sp. Pl. 366. Engl. Bot. t. 684. Woodv. Med. Bot. suppl. t. 266. (*Phellandrium*; Rivin. Pentap. Irr. t. 65. Dod. Pempt. 591. *Cicutaria palustris*; Ger. Em. 1063. Lob. Ic. v. 1. 735.)—Subdivisions of the leaflets divaricated, bluntish. Stem leafy.—Native of ditches, rivulets, and the margins of pools, in most parts of Europe, flowering copiously in June and July. The *root* is biennial, spindle-shaped, thick, with whorled fibres. *Stem* two or three feet high, thick, cylindrical, hollow, furrowed, bushy, with many wide-spreading branches; its strong fibres, when bleached and dissected by the water, forming an elegant, reticulated tube, often found about marshland ditches. *Leaves* spreading, dark shining green, smooth, thrice pinnate, cut, all the segments divaricated. *Umbels* on short stalks, opposite to the leaves, dense, with thick rays. *Flowers* purplish-white. *Fruit* somewhat angular, but not furrowed. The *leaves* are lengthened out in running streams, and the *flowers* rarely produced. When the plant happens to grow out of the water, the *leaves* are rounder and less divided, so as to assume a very different aspect.

2. *Ph. Mutellina*. Mountain Water Hemlock. Linn. Sp. Pl. 366. Jacq. Austr. t. 56. (*Mutellina*; Bauh. Hist. v. 3. 66. Camer. Epist. 8.)—Subdivisions of the leaves close, acute. Stem nearly naked.—Native of the alps of Austria, Carniola, Switzerland, and Siberia, flowering from June to September. The *root* is perennial, long,

and tapering, crowned with the rigid fibres of old leaf-stalks. Its flavour, and that of the whole herb, is compared by Clusius to the Carrot. *Stem* scarcely a foot high, erect, slightly branched, round, smooth, almost naked. *Leaves* subdivided as in the former, but their segments are narrower, more lanceolate, crowded, and very sharp. They are mostly radical, foliated by long stalks. *Umbels* terminal, reddish. *Fruit* somewhat angular. *Mutellina*, or rather *Muttellina*, is the vulgar name of this plant upon the alps, according to John Bauhin, who says the pastures where it grows are esteemed good for milch cows.

**PHELLOE**, in *Ancient Geography*, a pretty considerable town of the Peloponnesus, in Achaia, near Egira, according to Pausanias. In this place were temples of Diana and Bacchus, ornamented with statues.

**PHELLOS**, in *Botany*, a name used by some authors for the cork-tree.

**PHELLOS**,  $\varphi\epsilon\lambda\lambda\omicron\varsigma$ , in *Antiquity*, a festival in honour of Bacchus, being a preparative to the Dionysia.

**PELLUS**, in *Ancient Geography*, a town of Asia Minor, in Lycia, situated on low ground, opposite to Antiphellus.

**PELLUS**, or *Phello*, a town of the Peloponnesus, in the Elide, in the vicinity of Olympia. Strabo.

**PELLUSA**, an island situated near that of Lesbos. Pliny.

**PHELYPÆA**, in *Botany*, a genus of Tournefort's, restored by Desfontaines, after it had been all along confounded, by Linnæus and his followers, as well as by Jussieu, either under *LATHRÆA* or *OROBANCHE*. (See those articles.) The name was given in honour of the family of Phelipeaux, two of whom Tournefort mentions as the Mæcenates of his time; but we know nothing of their botanical claims, and feel little partiality for the name, except on account of its author. Thunberg and Schreber, supposing the Tournefortian genus abolished, have transferred it to an entirely new plant from the Cape; see Thunb. Nov. Gen. 91; and Schreb. Gen. 672. n. 1489 (not 489). The latter therefore will now require a new appellation. Tourn. Cor. 47. t. 479. Desfont. Atlant. v. 2. 60.—Class and order, *Didynamia Angiospermia*. Nat. Ord. *Personata*, Linn. *Pedicularæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, bell-shaped, in five, rather deep, ovate, obtuse, erect, slightly unequal segments, permanent. *Cor.* of one petal, ringent; tube slightly curved, ample, dilated upwards; limb in five short, broad, rounded, imbricated segments, the lower one most distant, with an elevated two-lobed palate, and intermediate longitudinal furrow. Nectary . . . . *Stam.* Filaments four, awl-shaped, about as long as the tube, two of them longest; anthers thick, oblong, hairy, approaching each other, and cohering by their pubescence, with two acute lobes. *Pist.* Germen superior, ovate; style cylindrical, the length of the stamens; stigma drooping, thick, of two obtuse lobes. *Peric.* Capsule ovate, compressed, of two cells and two valves, the partitions from the centre of each valve. *Seeds* numerous, minute, roundish.

Eff. Ch. Calyx deeply five-cleft, inferior. Corolla ringent; limb in five short rounded segments; the lowermost with an elevated palate. Anthers cohering. Capsule of two cells and two valves. Seeds numerous.

Obf. The calyx sufficiently distinguishes this genus from *Orobanche*, and indeed, as to number and form of the segments, from *Lathræa*. The *corolla* is very different from both. Not having examined the capsule ourselves, we cannot be certain that the supposed partitions are different from

what are termed receptacles in the character of *Lathræa*. Nothing is said, except by Forkall, of any thing like a nectariferous gland in *Phelypæa*; yet it can hardly be supposed wanting. Three species are recorded by authors.

1. *Ph. coccinea*. Scarlet Phelypæa. (*Ph. orientalis*, flore coccineo; Tourn. Cor. 47. t. 479. *Orobanche coccinea*; Willd. Sp. Pl. v. 3. 354. *O. Phelypæa*; Marschall von Bieberstein in Sims & Kon. Ann. of Bot. v. 2. 447. *Lathræa Phelypæa*  $\beta$ ; Linn. Sp. Pl. 844.)—Stem single-flowered. Three upper segments of the calyx cohering.—Gathered by Tournefort in the Levant: by von Bieberstein on grassy hills, in the district of mount Caucasus bordering on Circassia, and some other places, flowering in May or June. *Root* parasitical, perennial. *Stem* one or more, quite simple, a span high, brown, scaly, very like those of *Orobanche major*. *Flower* terminal, solitary, sessile, inclining toward one side, thrice the size of *O. major*, very handsome. *Calyx* the colour of the stem; its three upper segments erect, cohering, oblong, channelled; the two lower longer and more acute, directed forward, and applied to the tube of the corolla under the lower lip. *Corolla* beautiful; externally yellowish, and clothed with rather viscid pubescence, as in *Orobanche*; internally like velvet, and of the richest scarlet; with two large deep-black spots in the throat. *Stigma* entire, hemispherical. *Bieberst.*

2. *Ph. lutea*. Yellow Phelypæa. Desfont. Atlant. v. 2. 61. t. 146. (*Ph. lusitanica* flore luteo; Tourn. Cor. 47. *Orobanche tinctoria*; Forsk. Ægypt-Arab. 112. Vahl. Symb. v. 2. 70. Willd. Sp. Pl. v. 3. 353. *O. elegantissima verna*, flore luteo; Griseb. Lusit. 66. Morif. v. 3. 502. *Lathræa Phelypæa*  $\alpha$ ; Linn. Sp. Pl. 844.)—Stem many-flowered. Tube of the corolla contracted below; inflated above.—Native of Portugal, Barbary, and Arabia. Gathered at Algiers, by Broussonet and Durand; on the moist sandy banks of the river El hammah, near Mascara, by Desfontaines. Forkall says it grows parasitically on old roots. The *stem* of this very noble plant is erect, quite simple, smooth, succulent, scaly, from one to two feet high; its upper half consisting of a close cylindrical *spike* of numerous large yellow *flowers*, spreading every way. *Braçtes* large, ovate, crenate, with a pair of internal smaller ones. *Calyx* five-cleft about half way down. Tube of the *corolla* above an inch long, cylindrical beyond the calyx, then bent forward, and suddenly inflated; segments of the limb spreading, rounded, nearly uniform, of a rich shining yellow within. *Anthers* very hairy. The whole plant dries brown.

Forkall says the base of the *germen* is surrounded by a yellow ring. That our plant is what Griseb and Tournefort described, we know by an examination of original specimens. If Linnæus had compared Morison with Tournefort, he could never have supposed this and the foregoing to be only varieties. *Ph. lutea* has often thirty *flowers* in a spike.

3. *Ph. violacea*. Violet Phelypæa. Desfont. Atlant. v. 2. 60. t. 145. (*Orobanche Phelypæa*; Willd. Sp. Pl. v. 3. 352.)—Stem many-flowered. Tube of the corolla funnel-shaped.—Gathered by Desfontaines, in the sandy desert of Africa, near Tozzer.—Much resembling the last, except that the *flowers* are violet-coloured, with two yellow prominences on the palate, which appear less conspicuous, though they do exist, in the *flava*. The regular swelling of the *tube* from the bottom upwards is a mark of this species. It is justly termed by its discoverer "a very beautiful plant," flowering in winter. The *bractes* and *calyx* are coloured, partaking, in some degree, of the hue of the *corolla*.

We have great pleasure in restoring the original and characteristic

characteristic names of these three species, so perversely changed and confused by various hands.

PHENEOS, in *Ancient Geography*, a town of Arcadia, N.W. of Orchomené. It was originally built on the summit of a mountain, the ruins of which were seen by Pausanias. The new town was erected at the bottom of the same mountain; but the citadel was situated on a very elevated rock. At Pheneos are the ruins of a temple of Minerva Tritonia; on the declivity of the mountain was a stadium, and upon a ridge of it was the tomb of Iphicles, brother of Hercules, and another of Iolas, the brave companion of his travels. A religious ceremony was annually celebrated in honour of him. Mercury was the principal divinity of the country; who had a fine temple, with a marble statue, executed by a very ingenious statuary. Annual games, called "Hermæan," were celebrated in honour of him. The Pheneates had also a temple of Ceres; and the mysteries of this goddess were celebrated by them with great solemnity, and in the same manner as they were observed at Eleusis; and the people of the country claimed this original invention. Near Pheneos was a temple of Apollo Pythius, which was in ruins at the time of Pausanias. The inhabitants, however, continued to offer sacrifices to him, though they had only an altar of marble, instead of a temple. Evander is said to have been a native of Pheneos, according to the verse in Virgil, *Æn.* l. viii. v. 165:

"Accessi et cupidus Phenei sub mœnia duxi."

PHENEUS, a lake or marsh of the Peloponnesus, in Arcadia. According to Pausanias, it was the source of the river Ladon.

PHENGITES, in the *Natural History of the Ancients*, the name of a very beautiful species of alabaster. It is a very rude and irregular mass, very shattery and friable, yet of a brightness superior to that of most of the other marbles, and excelling them all in transparency; it is in colour of an agreeable pale, yellowish, white, or honey colour; the yellowish is more intense in some places than in others, and sometimes makes an obscure resemblance of veins. It is very weak and brittle in the mass; and when reduced to small pieces, easily crumbled between the fingers into loose but considerably large angular pieces, some perfect, others complex, irregular, or mutilated, and all approaching to a flat shape.

The ancients were very fond of this species in their public buildings; and the Temple of Fortune, built wholly of it, has long been famous. Its great beauty is its transparency, from which alone this temple was perfectly light when the doors were shut, though it was built without a window, and had no other light but what was transmitted through the stone its walls were built with. It was anciently found in Cappadocia, and is still plentiful there: we have it also in Germany and France, and in our own kingdom in Derbyshire, and some other counties. It takes an excellent polish, and is very fit for ornamental works, where there is no great strength required. Hill's *Hist.* of Foss. p. 490. See GLASS.

PHEONS, in *Heraldry*, the barbed head of darts, arrows, or other weapons.

PHEOS, in *Botany*, a name given by Theophrastus; Dioscorides, and others, to a plant used by the fullers in dressing their cloths, and of which there were two kinds, a smaller, called simply *pheos*, and a larger, called *hippophEOS*.

The name of this plant is sometimes written *phleos*; and it is by that confounded with a kind of marsh-cudweed, or gnaphalium, called also by that name; but it may be al-

ways found which of the two plants an author means, by observing the sense in which the word is used, and the use to which the plant was put. The *phleos*, properly so called, that is, the cudweed, was used to stuff beds and other such things, and to pack up with earthen vessels to prevent their breaking; but the *pheos*, improperly called *phleos*, only about cloths; this was, however, also called *slabe* and *enaphen*.

PHERÆ, in *Ancient Geography*, a river of the Peloponnesus, below the river Pamifus, in the gulf of Messenia. Ptolemy. Strabo.—Also, a town of Macedonia, in the Pelasgia, according to Ptolemy and Livy. But Cicero and Pausanias place it in Thessaly.—Also, a town of Asia, in the Serica. Ammian. Marcell.—Also, a town of Thessaly, on the confines of the Pelasgiotide, towards Magnesia and the Phitiotide. It was situated on the left bank of a small river, called Naurus, towards the S.E. of the lake Bœbeis. According to Strabo, it had a port on the Pelasgic gulf, called Pagafes. This town, in the time of Philip, the father of Alexander, occupied a considerable rank in Thessaly, as Alexander, who was its king, and whom the Greek authors denominate a *tyrant*, had subjected to his dominion several towns of Thessaly. The Thessalians implored succour of Philip, who defeated him, and soon after he was put to death by his own wife: Philip obtained from Lycophron, whom he twice vanquished, this town. On this occasion Philip restored liberty to the whole of Thessaly; but this town suffered by the ravages of war, when the Romans carried their arms into Thessaly and Macedonia.

PHERECRATES, in *Biography*, a Greek comic poet, the contemporary with Eupolis and Aristophanes, flourished about the year 420 B.C. He obtained a high reputation, writing in the utmost purity of style, and was the inventor of a measure called the Pherocratian, consisting of the three last feet of an hexameter, the first being invariably a spondee; of this, Horace's line "Quamvis Pontica pinus" is an example. The titles of several of his comedies have been preserved, with some fragments, particularly in Athenæus. In the *Observer* there are translations of three passages, one of which gives a striking idea of the comic extravagance of the author. A fragment relative to ancient music, cited by Plutarch, has been particularly examined by M. Burette in the Memoir of the Academy of Inscriptions. Gen. Biog.

PHERECYDES, a Grecian philosopher, the contemporary with Terpander and Thales, who flourished about the year 600 B.C., was a native of the island of Scyros, one of the Cyclades, near Delos. Some writers suppose that he derived his principles of philosophy from the sacred books of the Phœnicians, but others, who have carefully examined into the matter, think that he had them from the Grecian philosophers. Josephus advances the opinion that he studied in Egypt, which is not improbable, since that country, in his time, was universally resorted to as the seat of learning. It was pretended that he had the power of predicting future events; that he foretold the destruction of a vessel at sea, and the approach of an earthquake; and that the event, in both cases, justified the prophecy. Admitting, however, the truth of these stories, it is easy to imagine that his knowledge was the result of a careful observation of those phenomena which commonly precede storms and earthquakes, in a country where they frequently happen; and it is not improbable that Pherocydes, like many other ancient philosophers, availed himself of his superior knowledge of nature to impose upon the ignorant multitude, by pretending to powers that he did not possess. He is said to have been the first among the

Grecians,

Grecians who wrote concerning the nature of the gods; that is, who wrote upon that subject in prose, since, before his time, Orpheus, Musæus, and others, had written theogonies in verse. Pherecydes was much esteemed at Lacedæmon, on account of his poetry inculcating the maxims of Lycurgus. He died at the age of eighty-five. It is not easy to ascertain the nature of the doctrines which he taught: he probably believed in an eternal first cause of all things; and in the immortality of the soul. According to Cicero, he was the first philosopher in whose writings this doctrine appeared. He is said to have taught the belief of the transmigration of the soul: this is probably true, it being a tenet commonly received among the Egyptians, and afterwards taught by Pythagoras, who was a pupil of Pherecydes. Enfield's Hist. Phil.

PHERENDIS, in *Ancient Geography*, a town of Asia, in Greater Armenia, E. of the Tigris, between Siæ and Tigranocerta. Ptolemy.

PHEREPHATTIA, Φερειπῆτις, in *Antiquity*, a festival at Cyzicum, wherein a black heifer was sacrificed to Pherephatta or Proserpine.

PERME, or FERME, in *Ancient Geography*, a mountain of Egypt, in the Thebaid, which is said to have been the abode of Paul the Hermit.

PERONIA, a town on the E. side of the island of Sardinia, between the mouth of the river Cædrus and the town of Olbia. Ptolemy.

PHERRACIA, a town of Asia, in the Colchide. Strabo.

PERVINTASKOI, in *Geography*, a cape of Russia, on the E. coast of Nova Zembla. N. lat. 77° 30'. E. long. 77° 14'.

PHESTE, in *Ancient Geography*, a town of the island of Cyprus, situated on the sea-coast, in the southern part, according to Diodorus Siculus. But Dionysius Periegetes places it in the interior of the island, near Gortyna.

PHESTI, a place of Italy, in Latium, at the extremity of the territory, belonging to the city of Rome, where, according to Strabo, the priests offered the sacrifices called "Ambarvalia."

PHEUGARUM, a town of Germany, between Tullurgium and Canduum. Ptolemy.

PHIAL, PHIALA, formed of φιάλη, which signifies the same, a small thin glass bottle, popularly called a *vial*.

PHIAL, *Leyden*. See LEYDEN.

PHIALA, in *Ancient Geography*, a fountain or lake at the foot of mount Hermon, which, according to Josephus, was one of the two sources of the Jordan: he says, that it ran by subterraneous canals, and then gushing out of the earth, joined the other at the town of Dan.

PHIALIA, a town of the Peloponnesus, in Arcadia, between Heræa and Tegea. Ptolemy. It was also called Phigalea. Steph. Byz. Paufanias.

PHIDALIA, a small port of Thrace, upon the Thracian Bosphorus, towards the S.E. of the gulf Leostenius. A small river runs into this port.

PHIDIAS, in *Biography*, an Athenian, the most celebrated sculptor of antiquity. His distinguishing character was grandeur and sublimity; and he particularly studied optical effects. To this purpose it is related, that having, in competition with Alcarnenes, made a statue of Minerva to be placed on a column; the work of the latter appeared so finished when viewed on the ground, that it was universally admired, whilst that of Phidias seemed to be a mere rough sketch; but when both were seen from their destined situations, the beauties of the first were lost, while

the second produced the most striking effect. After the battle of Marathon he converted a block of marble, which the Persians had brought for a trophy of their expected victory, into a fine statue of Nemesis, the goddess of Vengeance. His reputation was so high at Athens, that Pericles regarded him as his particular friend, and appointed him superintendent of all the public edifices with which that city was decorated. One of his greatest performances was a colossal statue of Minerva, in the temple called Parthenon. In this work he displayed his skill in minute sculpture, no less than his grandeur of conception in the main figure. On the convexity of the goddess's shield was represented the battle of the Amazons, and on its concave surface the combat of the gods with the giants; whilst her slippers were adorned with the fight of the Centaurs and Lapithæ. On her breast-plate was a Medusa's head. The base contained the birth of Pandora, with twenty figures of the gods. He is said to have been the first who brought the bas-relief to perfection. His fame and fortune excited envy, and several accusations were brought against him, which he was enabled to repel. At length he was charged with having introduced the portraits of himself and Pericles in the battle of the Amazons, and this being regarded as a kind of profanation, he was thrown into prison, where, according to Plutarch, he died. Others, however, affirm, that he escaped to Elis, where he afterwards executed his Olympian Jupiter, the most famous piece of sculpture in all antiquity. It was a colossal statue, sixty feet high, of incomparable majesty and dignity in its attitude and expression. The name of the artist was engraved on the base. The Eleans, in gratitude for this extraordinary work, settled upon his descendants a perpetual office, the sole duty of which was to preserve the lustre of the statue. Plutarch.

PHIDITIA, or PHILITIA, in *Antiquity*, feasts instituted by Lycurgus, and celebrated with great frugality at Lacedæmon.

The Phiditia were held in the public places, and in the open air: rich and poor assisted at them alike, and on the same footing; their design being to keep up peace, friendship, and good understanding and equality among all the citizens, great and small. Bernegger says, they who attended at this feast, brought each a bushel of flour, eight measures of wine, called chorus, and five minæ of cheese, and as much figs.

The Phiditia of the Greeks were much the same with the Charistia at Rome.

PHIGALIA, or PHIALIA, in *Ancient Geography*, a town of Arcadia, upon a high and craggy rock, near the river Lymax, and S.W. of Megalopolis. This town, being the key of Arcadia, appeared so desirable a possession to the Lacedæmonians, that they laid siege to it, and took it in the year 659 B.C. The Phigalians, desirous of regaining it, consulted the oracle of Delphos, who directed them to procure 100 chosen men from Orestasium to accompany them in their expedition. Nevertheless, these brave men perished in the attempt. The Orestasians, however, in concert with the Phigalians, attacked their enemies, and made a great slaughter of the Lacedæmonians, who all perished, except some few, who saved themselves by flight.

In this town were two remarkable monuments; one a statue of the famous athleta, Arrachion: and the other, the place of burial of the 100 Orestasians, who generously devoted themselves to death in order to secure the conquest of the town. Upon the summit of the rock, which was the site of Phigalia, there was a temple of

Diana Conservatrix, in which was her statue. There were some other statues in a place of exercise not far distant.

PHIGIA, a town in the interior of Arabia Felix, between Saphtha and Badais. Ptolemy.

PHI-HAHIROTH, or PI-HAHIROTH, a town situated on the banks of the Red sea: it denotes the defile or the mouth of Hahiroth. Calmet supposes that it was the town of Heroopolis.

PHILA, an island of Africa, in the course of the river Triton, in Libya. Diod. Sic.

PHILA, in *Mythology*, one of the attributes of Venus, which distinguishes her as the mother of love, from *Proserpine*, to love.

PHILACTES, in *Ancient Geography*, a river of Asia Minor, which ran into the gulf "Hermonius," in the Thracian Bosphorus.

PHILADELPHIA, in *Antiquity*, were games instituted at Sardis, to celebrate the union of Caracalla and Geta, the sons of Septimius Severus.

PHILADELPHIA, in *Ancient Geography*, a town of Asia Minor, at the foot of mount Tmolus, at some distance E. of Sardis. It derived its name from Attalus Philadelphus, the brother of Eumenes: and was much celebrated for its feasts and public games. It became episcopal, and was very considerable when the Turks took possession of it.—Also, a town of Asia, in the interior of Cilicia, between Domitopolis and Seleucia Aspera, according to Ptolemy: it was seated on the Calycadnus, at a small distance W. from Olba. This also became episcopal.—Also, a capital of the Ammonites, situated on the mountains of Gilead, towards the sources of the river Arnon. Its eastern name was Rabbath-Ammon. According to Steph. Byz. it was the third town of Syria, which assumed successively the name of Ammana (or Ammon), Astarte, and then Philadelphia, after the name of Ptolemy Philadelphus. It was one of the Decapolis of Palestine. See AMMONITES.—Also, a town of Egypt. Steph. Byz.

PHILADELPHIA, in *Geography*, a populous and highly cultivated county of Pennsylvania, bounded W. by Delaware county, N.W. by Montgomery, N.E. by Poquasin creek, which separates it from Burk's county, and S. and S.E. by the river Delaware, which divides it from the state of New Jersey. It contains about 89,600 acres, and is divided into 18 townships, and contains 81,009 inhabitants. On the banks of Schuylkill in this county is an excellent quarry of marble, which supplies the stone-cutters of Philadelphia.

PHILADELPHIA, the metropolis of Pennsylvania, is situated in the county to which it gives name, on the western bank of the river Delaware, which is here a mile broad. This city is distant 110 miles from the Atlantic ocean by the course of the bay or river, and about 55 or 60 in a S.E. direction. The river is navigable for a 74-gun ship as far as the city; for sloops 35 miles farther to Trenton, and for boats loaded with eight or nine tons to a greater distance of 100 miles. Philadelphia was laid out by the famous William Penn (see his article) in the year 1683, and settled by the influx of adventurers from England to such a degree, that in less than a century it was estimated to contain 6000 houses, and 40,000 inhabitants, including those of the suburbs as well as the city. The form of the ground plot of the city is an oblong square, about one mile N. and S. and two E. and W. lying in the narrowest part of the isthmus between the Delaware and Schuylkill rivers, about five miles in a right line above their confluence. In the progress of building, it was found that the Delaware

front was of itself sufficient for quays and landing places. The buildings now occupy a space not exceeding three miles in length from N. to S., and in the most extended part do not reach a mile from the Delaware. All the houses built beyond the boundary line of the oblong square are said to be in the "Liberties," as the jurisdiction of the corporation does not extend to that part of the town. Here the streets are very irregularly built. But the city is intersected by a great number of streets, which cross each other at right angles. Of these there were originally nine, which extended from the Delaware to the Schuylkill, and these were crossed by 23, running N. and S. The number of squares in the original plan was 184; but as several of these have been intersected by new streets, their number now amounts to 304; and several of these are again intersected by lanes and alleys. Broad-street is 113 feet wide; High-street 100; Mulberry-street 60; and the other streets in the original plan 30 feet wide. The greatest part of the city is tolerably well paved with pebble stones in the middle, and with neat foot paths of brick, furnished with common sewers and gutters, so that the streets are, in general, kept very clean. The space occupied by Water-street was intended, in the original plan, for a cart way, in order to accommodate the wharfs and stores; but it is now occupied, a few vacancies excepted, by lofty houses, reaching through the whole front, and commodious wharfs of a rectangular form, and constructed of wood, are extended into the river, and here the largest ships that are in the port may lie in safety, both to receive and discharge their cargoes; and they are defended from the ice, in winter, by piers firmly fixed. Another street, called Dock-street, was formerly a swamp, but is now by a plantation of a row of Lombardy poplars on each side rendered one of the pleasantest streets in the city. Lamps, to the amount in number of 662, disposed at convenient distances, give light to all parts of the city in the night.

The houses in the city and suburbs are generally constructed of brick, three stories high, plain and neat, without much ornament. The general height of the ground, on which the city stands, is nearly 40 feet above the Delaware; but some of the streets are considerably lower, and have on this account been subject to damage from the overflow of the river, by flood tides, and a strong south-east wind.

The city contains 27 places for public worship, viz. five for Friends or Quakers, six for Presbyterians and Seceders, three for Episcopalians, three for Roman Catholics, two for German Lutherans, two for Methodists, one for German Calvinists, one for Swedish Lutherans, one for the Moravians, one for Baptists, one for Africans, and a Jewish synagogue. The other public buildings are a state-house and offices, two city court-houses, a county court-house, an university, the philosophical society's hall, a public library, an hospital, dispensary, an alms-house, a gaol, three incorporated banks, two dramatic theatres, a medical theatre, a laboratory, an amphitheatre, four brick market-houses, a fish-market, a house of correction, and a powder magazine. Two steam-engine houses have not long ago been erected, for supplying the city with wholesome water from the Schuylkill. The roof of the first Presbyterian church is supported in front by six pillars of the Corinthian order, and the whole building would do honour, by the elegance of its structure, to any part of Europe. The German Lutheran church, erected to supply the place of that which was burnt in 1795, is one of the handsomest churches in the United States. Each of the Episcopal churches is furnished with an organ; so are the German, and two of the

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Roman Catholic churches. The state-house was erected about the year 1753, and its architecture is admired. Adjoining to it is a garden, which occupies a whole square, and is ornamented with several rows of trees and gravel walks: that which was formerly a burying-place, is now converted into a public walk, and planted with rows of trees, so as to form a pleafant promenade. The Philadelphia library originated with Dr. Franklin, and was incorporated in 1742, and has been gradually gaining an increafe in books, &c. At present it contains upwards of 12,000 volumes, befides a museum, and a valuable philofophical apparatus. It is open every day in the week, except Sunday, to any perfon who has an inclination for reading. Books may alfo be borrowed out of the library, by leaving a deposit to infure their safe return, and paying a fmall fum for the ufe of them. The fubfcribers amount to feveral hundred, and each fubfcriber pays ten fhillings annually. The building belonging to the library company is an elegant ftructure; and in front of the edifice is a ftatue of Dr. Franklin of white marble, executed in Italy at the expence, as it is faid, of 500*l.*, and given to the company by William Bingham, efq. The apartments of the public gaol are arched with ftone, as a fecurity againft fire; and the whole building is the largeft, ftrongeft, and neateft of the kind in the United States. Adjoining to it is a work-houfe, in which the fexes are kept apart, and the criminals are feparated from the debtors, which undoubtedly is a circumftance of great importance. Here are alfo apartments for the folitary confinement of criminals. The market-houfe is amply fupplied with various provisions, which are expofed for fale every Wednesday and Saturday. This is an extenfive building, and is fupported by 300 pillars. The new bank of Pennsylvania, lately erected under the fuperintendance of Mr. Latrobe, is a large and remarkably elegant edifice of marble, of the Ionic order, conftructed after the model of the ancient temple of Minerva in Greece. The eaftern and western fronts are adorned with two lofty colonnades of folid marble. The new theatre near the ftate-houfe, finished in 1793, is fpacious and convenient. The large building, intended for the accommodation of the prefident of the United States, has been purchafed by the univerfity of Pennsylvania, which confifts of two literary institutions, that had for fome time been eftablifhed in Philadelphia; one defignated by the above name, the other by that of the college, academy, and charitable fchools of Philadelphia. They now confitute a refpectable feminary, incorporated in 1791. The philofophical apparatus has lately been very much enlarged at a confiderable expence, and is very complete of its kind. The funds of the univerfity produce annually a revenue of about 2365*l.* The aggregate number of ftudents in the feveral fchools is, on an average, about 510; and thofe ufually admitted to degrees every year are about 25. The chief literary and humane focieties are the American philofophical fociety, formed in 1769; the college of phyficians, intituted in 1737, and incorporated in 1739; the fociety for promoting political inquiries, intituted in 1787; the Pennsylvania hofpital, eftablifhed in 1751; the Philadelphia difpenfary, in 1786; the Pennsylvania fociety for the abolition of flavery, begun in 1774, and enlarged in 1787; the fociety for alleviating the miferies of prifons; the Pennsylvania fociety for the encouragement of manufactures and ufeul arts, intituted in 1787; the Philadelphia fociety for the information and affiftance of immigrants, intituted in 1794; and two other focieties of the fame kind; and an humane fociety, intituted in 1790, an agricultural, marine, and various charitable focieties. Here are alfo a grand lodge of free and accepted mafons, and eight fubordinate lodges. Few cities in the world, of the fame population and wealth

as Philadelphia, are more liberally provided with ufeul institutions, both public and private. Here are alfo numerous academies for the inftruction of both fexes. Almoft every religious fociety has one or more fchools under its immediate direktion, in which children belonging to the fociety are taught to read and write, and are furnifhed with books and ftationary articles.

In the city and fuburbs are ten rope-walks, which manufacture about 800 tons of hemp annually; 13 breweries, which are faid to confume 50,000 bufhels of barley yearly; fix fugar-houfes; feven hair-powder manufactories in and about town; two rum diftilleries and one rectifying diftillery; and three card manufactories. The other manufactories are 15 for earthen-ware, fix for chocolate, four for muftard, three for cut nails and one for patent nails, one for iteel, one for aquafortis, one for fal ammoniac and Glauber falts, one for oil colours, twelve for brufhes, two for buttons, one for Morocco leather, and one for parchment; befides gun-makers, copper-fmiths, hatters, tin-plate workers, coach-makers, cabinet-makers, and a variety of others. In this city is the public mint, in which the national money is coined. The great number of paper-mills in the ftate enable the printers to carry on their bufinefs more extenfive than is done in any other place in America. There are 31 printing-offices in this city; five of which publifh each a daily gazette; two others publifh gazettes twice a-week, one of which is in the French language; befides four weekly papers, one being in the German language. The other offices are employed in printing books, pamphlets, &c. The catalogue of books for fale in this city contains upwards of 300 fets of Philadelphia editions, together with a great variety of maps and charts. The pleafure-carriages are, according to enumeration, 553 two-wheeled carriages, 80 light waggons, 137 coaches, 22 phaetons, 35 chariots, and 33 coachees. The coachee is a carriage thought to be peculiar to America: the body of it is rather longer than that of a coach, but of the fame fhape; in the front it is left quite open down to the bottom, and the driver fits on a bench under the roof of the carriage. There are two feats in it for the paffengers, who fit with their faces towards the horfes. The roof is fupported by fmall props, which are placed at the corners: on each fide of the doors, above the pannels, it is quite open; and to guard againft bad weather, there are curtains, which are made to let down from the roof, and faftened to buttons placed for the purpofe on the outside. There is alfo a leathern curtain to hang occafionally between the driver and the paffengers. The light waggons are on the fame conftruction, and are calculated to accommodate from four to twelve people. The roads from this city are in a ftate of progrefive improvement; ftage-coaches perform the journey to Lancafter, the diftance being 58 miles, on the new turnpike-road, in 11 hours.

This city is governed by a mayor, recorder, eight aldermen, and fixteen common-council men, who make a quorum to tranfaci bufinefs: they have full power to confitute and appoint laws and ordinances for the government of the city. The mayor, recorder, and aldermen, are juftices of the peace, and juftices of oyer and terminer. They hold a court four times a-year, to take cognizance of all crimes and mifdemeanors committed within the city; and two aldermen, appointed by the mayor and recorder, hold a court on Mondays and Thursdays in every week, to determine matters cognizable before a juftice of the peace. The trade of Pennsylvania is chiefly carried on from this city, and there are few commercial ports in the world where fhips from Philadelphia may not be found in fome feafon of the year; but the amount of the exports and imports has varied at different periods, and under different circumftances.

Accordingly the trade suffered an interruption in 1793, which lasted nearly five months, in consequence of the yellow fever, of three months' duration, to which nearly 5000 inhabitants were victims. In the year 1794, there were 9000 houses in the city, besides 400 which were then building. In 1800, the number of inhabitants within the city was 41,220. The suburbs and county contained 39,783, and of these only 85 were slaves. In 1810, the number of inhabitants was 92,247; and in Pennsylvania the number was 810,091.

Philadelphia is the grand residence of Quakers or Friends in America; but their number does not bear the same proportion now to that of other citizens, which it did formerly. At present, it is said, they form about one-fourth only of the inhabitants. This is not owing to any diminution of the number of Friends, because, on the contrary, they have considerably increased, but to the great influx into the city of persons of a different persuasion. According to a list published of the births and deaths in the several religious societies of Philadelphia, it appears that from August 1, 1792, to August 1, 1793, the births amounted to 2511, and the deaths to 1497. The inhabitants consist of English, Irish, Scots, Germans, French, and America-born citizens, descended from people of these different nations, who are of course by far the most numerous class. They are all, for the most part, engaged in some sort of business; few living, without any ostensible occupation or profession, on the fortunes which they themselves have raised. The purchase and sale of lands constitute objects of peculiar attention in Philadelphia, as well as in other parts of America. It may naturally be expected, that amongst a people assembled from so many different quarters, there should be a great diversity of manners. It is a remark, however, says Mr. Weld, very generally made, not only by foreigners, but by persons from other parts of the United States, that the Philadelphians are extremely deficient in hospitality and politeness towards strangers. This author observes, that in the uppermost circles of Philadelphia, pride, haughtiness, and ostentation are conspicuous; so that it should seem they would be rendered happy if an order of nobility were established, which would serve to exalt them in rank as much above their fellow-citizens as they are in their own imagination. It is observed further, that in the manners of the people in general there is a coldness and reserve, as if they were suspicious of some design against them, which chill to the heart those who come to visit them. It is added, that in their private societies a *tristesse* is apparent, near which mirth and gaiety can never approach.

The women, it is said, when young, are generally very pretty; but when they become mothers, in advancing age, they lose their beauty. Their complexions fade, their teeth begin to decay, and they manifest a wonderful change. In a few instances only, says Mr. Weld, it would be possible to find a fine woman at the age of 40, who has had a large family. The sudden decay of the teeth is a circumstance that has attracted attention, and that has been made the subject of investigation. It has been ascribed to various causes, and particularly to the immoderate use of confectionary; but it is more probably owing to the very general use that is made of salted provisions.

The greater number of servants in Philadelphia consists of emigrant Europeans, who only remain in that condition till they can save a little money, and gain that kind of independence which every person, who is industrious, may enjoy in America. The wages of those who are retained in service are exorbitant. The Americans themselves consider servitude as suitable only to negroes. Amongst the generality of the common sort of people in the United

States, and particularly amongst those of Philadelphia, there is, says Mr. Weld, a want of good manners, which excites the surmise of almost all foreigners. He adds, "civility cannot be purchased from the lower classes of people on any terms: they seem to think, that it is incompatible with freedom, and that there is no other way of convincing a stranger that he is really in a land of liberty but by being furly and ill-mannered in his preference."

The environs of Philadelphia are pleasant and well cultivated. Towards the north are Kensington, near the suburbs on Delaware, noted for ship-building; Germantown, a populous neat village, with two German churches; and Frankfort, another village, both within seven miles; besides many country seats. Towards the south is Darby, a small, pleasant borough, above seven miles distant, and on Schuylkill, four miles from the city, the botanical garden of Messrs. Bartrams. In the west, on the same river, 18 acres of ground have been declined for a public botanical garden.

As you approach Philadelphia by the river, it cannot be seen farther off than three miles; a point of land covered with trees concealing it from the view. On weathering this point it suddenly opens upon you, and at that distance looks extremely well; but, on a nearer approach, the city makes a poor appearance, as nothing is visible from the water but confused heaps of wooden store-houses, crowded upon each other, the chief of which are built upon platforms of artificial ground, and wharfs which project a considerable way into the river. Behind these wharfs, and parallel to the river, runs Water-street, which does not give a stranger a very favourable opinion of Philadelphia. The street is about 30 feet wide; and behind the houses is a high bank, supposed to be the old bank of the river, which renders the air very confined. But modern improvements will remedy this inconvenience. Philadelphia is distant 728 miles S.W. of Passamaquoddy, the most easterly part of the sea-coast of the United States; 347 S.W. of Boston; 958 W. of New York; 102 N.E. of Baltimore; 144 N.E. of Washington; and 925 N.E. by N. of Savannah in Georgia. N. lat. 39 56' 54". W. long. 75 13' 45". Morfe's Geog. vol. i. Weld's Travels, &c. vol. i. See PENNSYLVANIA.

PHILADELPHIA Stones, a name given by some authors to what are called by others *Christians' bones*, found in the walls of that city. It is a common error, that these walls are built of bones, and the tradition of the country is, that when the Turks took the place, they fortified it for themselves, and built their walls of the bones of the Christians whom they killed there. Dr. Smyth, in one of his epistles, mentions this wall as an instance of the Turkish barbarity; but this is an idle opinion, what passes for bone being only a loose and porous stone, of the sparry kind, found in an old aqueduct, which is still in the wall. Sir Paul Rycout brought home pieces of these stones, which he also supposed to have been bones, but on examination they proved to be no other than various bodies, chiefly vegetable, incrustrated over and preserved in a spar of the nature of that which forms incrustations in Knareborough Spring, and other places with us. These bodies are often cemented together in great numbers by this matter, and their true shape lost in the congeries, till a diligent and judicious eye traces them regularly.

PHILADELPHIAN SOCIETY, in *Ecclesiastical History*, an obscure and inconsiderable society of mythes, formed, towards the close of the 17th century, by an English female fanatic, named Jane Leadley, who seduced by her visions, predictions, and doctrines, several disciples, among whom were some persons of learning. This woman apprehended, that all dissensions among Christians would cease, and the kingdom

kingdom of the Redeemer become a scene of charity, concord, and felicity, if Christians, without regarding the forms of doctrine or discipline that distinguish particular communions, would all join in committing their souls to the care of the internal guide, to be instructed, governed, and formed by his divine impulse and suggestions. Nay, she pretended a divine commission to proclaim the approach of this glorious communion of saints; and imagined that the society established by herself was the true kingdom of Christ. One of her leading doctrines was, that of the final reformation of all intelligent beings to perfection and happiness.

PHILADELPHUS,  $\Phi\lambda\alpha\delta\epsilon\lambda\phi\varsigma$ , in *Antiquity*, a title or surname, borne by several ancient kings; formed from the Greek  $\phi\lambda\alpha\delta\epsilon\lambda\phi\varsigma$ , *friend, lover*, and  $\alpha\delta\epsilon\lambda\phi\varsigma$ , *brother*; *q. d.* one who loves his brother, or brethren.

Ptolemy Philadelphus erected a library at Alexandria, and furnished it with four hundred thousand, others say with seven hundred thousand volumes, by the advice, and with the assistance, of Demetrius Phalereus. See ALEXANDRIAN *Library*.

It was the same Philadelphus that procured the Greek version of the books of Moses, called the *Septuagint*.

Father Chamillart has a medal of the queen of Comagene, which bears the title of Philadelphe, without any other name. M. Vaillant tells us, that Philip, king of Syria, had also the title Philadelphus.

PHILADELPHUS, in *Botany*,  $\Phi\lambda\alpha\delta\epsilon\lambda\phi\varsigma$ , the name of a shrub mentioned by Athenæus, which it is impossible for us to ascertain. Caspar Bauhin first applied this synonym to our Syringa, or Mock Orange, with which it remains, as the generic appellation. Linnæus supposes it was designed to commemorate Ptolemy Philadelphus, king of Egypt; but a much more probable opinion seems to be, that the plant of Athenæus was of the twining or clasping kind, something like *Periploca græca*; and that the word, by a poetical fancy, was intended to express its brotherly love for those near it. The name *Syringa*, which Tournefort retained for this shrub, and by which it is now universally called in English, originated in a confusion of ideas. That name equally belongs to the Lilac; and though really, as Bauhin says, of Moorish origin, has been supposed to be derived from  $\sigma\upsilon\gamma\upsilon\lambda\iota\varsigma$ , *a pipe*, because the young branches of Lilac are used in Africa and the Levant for tobacco-pipes. Those of our *Philadelphus* also are reported to serve the same purpose. Hence one shrub has been termed *Syringa cærulea*, or Blue Pipe; the other *S. alba*, or White Pipe. But their wide generic difference, requiring an alteration of this unscientific nomenclature, and *Lilac* being barbarous, Linnæus was perhaps led, by the pipe-like flower, to prefer *Syringa* for that genus; especially as *Philadelphus* was already applied to the other. Jussieu however, following Tournefort, retains *Lilac*, though against his own general rule.—Linn. Gen. 247. Schreb. 332. Willd. Sp. Pl. v. 2. 947. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 3. 180. Juss. 325. Lamarck Illustr. t. 420. Gærtn. t. 35. (*Syringa*; Tourn. t. 389.)—Class and order, *Icosandria Monogynia*. Nat. Ord. *Hesperideæ*, Linn. *Myrti*, Juss.

Gen. Ch. *Cal.* Perianth superior, of four oblong, acute, equal, spreading leaves. *Cor.* Petals four, roundish-ovate, sessile, flat, large, spreading. *Stam.* Filaments 20, awl-shaped, the length of the calyx; anthers erect, with four furrows. *Pist.* Germen inferior, pointed; style thread-shaped, in four deep segments; stigmas simple. *Peric.* Capsule ovate, pointed at each end; coated below; naked, and rising rather above the insertion of the calyx, at the top, of four cells, and four valves, with partitions from their centres. *Seeds* numerous, minute, oblong, decumbent, inserted into

the thickened edges of the partitions, each invested with a tapering tunic, fringed at the base.

Ess. Ch. Calyx of four leaves, superior. Petals four. Style four-cleft. Capsule of four cells. Seeds numerous, each in an oblong tapering tunic.

Obs. The number, in the parts of fructification, occasionally varies from four to five. For the difference, between this genus and LEPTOSPERMUM, see that article.

1. *Ph. coronarius*. Common Syringa, or Mock-Orange. Linn. Sp. Pl. 671. Willd. n. 1. Curt. Mag. t. 391. (*Syringa alba*; G. r. Em. 1399.)—Leaves with shallow teeth. Native of the south of Europe, and north of Africa, if we mistake not, though so generally cultivated, that we know not where it can be seen truly wild. Dr. Sims in Curt. Mag. p. 1478, suspects it may come from Japan. In our gardens and shrubberies it is a hardy deciduous tall shrub, flowering in May and June. The leaves are elliptical, recurved, opposite, on short stalks, darkish green, smooth, with broad shallow teeth; their taste remarkably like cucumber, but disagreeable if too copiously taken. Flowers in dense terminal upright clusters, large, white, looking somewhat like those of the Orange, powerfully scented, so as to be intolerable to most people in a close room, though pleasant in the open air. Gerarde, having laid some in his chamber window, says they awaked him out of his sleep, and he was forced to throw them away. There is a dwarf variety.

2. *Ph. inodorus*. Carolina Scentless Mock-Orange. Linn. Sp. Pl. 672. Willd. n. 2. Curt. Mag. t. 1478. (*Ph. flore albo majore inodoro*; Catesb. Carol. v. 2. 84. tab. 84.)—Leaves entire. Native of Carolina. Rather more tender than the former, and not often met with in gardens, though it is preserved in the open ground at Kew. This is a humbler, more slender and spreading shrub than the common kind, bearing fewer, rather later, and much larger, as well as more elegant, snow-white flowers, which are destitute of scent; a quality that might render this species, to some persons, the most desirable of the two.

PHILADELPHUS, in *Gardening*, contains plants of the hardy, deciduous, flowering, shrubby kind, of which the species cultivated, is the common syringa, or mock orange (*P. coronarius*).

There are two species; the dwarf syringa, which seldom rises above three feet high; the leaves are shorter, more ovate, and little indented on their edges; the flowers come out singly from the side of the branches, and have a double or treble row of petals of the same size and form as the other, and the flowers have the same scent; but flowering very rarely, it is not so much in estimation.

And the Carolina syringa, which rises with a shrubby stalk about sixteen feet high, sending out slender branches from the sides, opposite to each other; the leaves smooth, shaped like those of the pear-tree, entire, opposite, on pretty long footstalks; the flowers are produced at the ends of the branches; they are large, but without scent; each has four white oval petals spreading open, and a large calyx, composed of four acute-pointed leaflets.

*Method of Culture.*—These plants may be increased by suckers, layers, and cuttings. The suckers are sent from the roots in great plenty; these should be taken from the old plants in autumn, and be planted in a nursery, to grow one or two years, till they have obtained sufficient strength, when they may be removed to the places where they are to remain.

The layers may be laid down in the autumn, being made from the young twigs. These may be taken off in the following autumn, when well rooted, being planted out where they are to remain.

The cuttings of the young shoots may be planted in the autumn, in a shady situation, where they soon form plants.

The plants are extremely hardy, and thrive in almost any soil or situation, but grow taller in light good ground than in that which is stiff.

These plants are commonly disposed in plantations of flowering shrubs, among others of the same growth; mixing very well with lilacs, gelder roses, and laburnums; and particularly valuable from their thriving under the shade of trees, and forming a blockade against low buildings, where persons have no objection to their strong smell.

PHILÆNI, in *Mythology*, two brothers reckoned by the Carthaginians among their gods. These brothers, having been sent, by their countrymen, to accommodate some differences with the Cyreneans, and, in conjunction with the commissaries appointed by these people, to settle the limits of their respective dominions, by fraud extended their own frontiers to the prejudice of the others. The Cyreneans, incensed at this unfair dealing, would not cede the tract demanded, unless the Philæni would suffer themselves to be buried alive in the place which they had pitched upon for their boundary. To this proposal they instantly agreed, and had afterwards two altars erected to their memory; which served as a land mark or limit to the Carthaginian territories on the side of Cyrenaica for many succeeding ages. Sallust, Mela, and Valerius Maximus, relate all the particulars of this story.

PHILÆNORUM ARA, in *Ancient Geography*, the altar of the Philæni, a place of Africa, on the southern coast, and nearly at the bottom of the gulf which forms towards the S.E. the greater Syrtis. It derives its name from the circumstance mentioned in the preceding article.

PHILAMMON of Delphos, in *Biography*, the son of Chrysothemis of Crete, obtained the prize at the Pythic games the second time they were celebrated. His father was victor at the first, and his son Thamyris won the third prize. Chrysothemis was the son of Carmanor, who lived before Homer, and was the twin brother of Antolyceus, maternal grand father of Ulysses. Their mother, Rhiona, daughter of Dedalion, brother of Ceyx, king of Trachia, was beloved the same day by Apollo and Mercury; at the end of nine months Antolyceus and Philammon were born. Philammon sung to his lyre the birth of Apollo and Diana. Plutarch says that he sung in verse the birth of Latona, Apollo, and Diana. It was troops of mortals, male and female, who danced and sung the praises of the gods to the sound of instruments. His son Thamyris was celebrated for the dispute which he had with the Muses.

PHILANDER, in *Zoology*. See DIDELPHIS.

PHILANTHROPOS, in *Botany*, a name used by some authors for the common *aparine*, *cleavers*, or *goose-grass*.

PHILANTHROPY, φιλανθρωπία, *love of mankind*, a general benevolence towards the species. See PASSIONS.

PHILARMONICI, is the denomination of a literary society established at Verona in 1543. See ACADEMY.

PHILAUTIA, φιλαυτία, formed from εἶδος, *amicus*, and αὐτός, *ipse*, in the *Schools*, *self-love*, a vicious fondness and complaisance for a man's self. See PASSION and SELF-LOVE.

PHILE, MANUEL, in *Biography*, a modern Greek poet, was a native of Ephesus, and flourished about the year 1321, under the emperor Michael Paleologus the younger, to whom he dedicated a poem on the properties of animals, composed in Iambic verse. It was printed first in Greek at Venice, in 1530. In the year 1730 an edition in Greek and Latin was given by Corn. de Pauw at Utrecht. He was author of other poems, some of which are contained in Fabricius' Biblioth. Græc. All his poems, under the title of Car-

mina, were edited by Wensdorf, at Leipzig, in 1768. *Moreri*.

PHILEBERT, in *Geography*, a town of France, in the department of the Lower Loire, and chief place of a canton, in the district of Nantes. The place contains 2032, and the canton 7473 inhabitants, on a territory of 305 kilometres, in six communes.

PHILELEUTHERUS, Φιλελευθερος, formed of φιλος, and ελευθερος, *free*, a lover of liberty.

PHILELIA, the name of a song among the ancient Greeks, in honour of Apollo. Athenæus, lib. xiv. cap. 3.

PHILEMON, in *Biography*, a Greek comic poet, son of Damon, flourished about the year 274 B.C. in the reign of king Antigonus Gonatas. He was a rival of Menander, against whom he frequently gained the prize. The titles of some of his plays are preserved; and the "Mercator" of Plautus is professedly taken from the Εμπεδος of Philemon. It is said that he died at the age of 97 or 99, and that the cause of his death was a fit of laughter, occasioned by seeing his ass eat figs. Philemon the younger, son of the preceding, was also a comic writer, and, according to Suidas, composed 54 comedies, of which fragments remain, and have been published with those of Menander, and also in the *Poet. Græc. Minor*.

PHILESLIA, in *Botany*, so named by Commerçon, from φιλειν, *to love*, in allusion to its lovely aspect; nor could many plants be more worthy of such a distinguishing appellation. See ENARGEA.

PHILETA, in *Ancient Geography*, a town of Asia Minor, in the vicinity of Caria.

PHILETERIUM, in *Botany*, a name used by some authors for the *behen album*, the common white-flowered bladder-campion, called *white ben*.

PHILIA, in *Ancient Geography*, an isle of Egypt, on the confines of Ethiopia, near the town of Tacompson. Steph. Byz.—Also, a promontory of Thracia, upon the Euxine sea, near Philopolis. Ptolemy.

PHILIASKOI, in *Geography*, a town of Russia, in the government of Tobolsk, on the Irtysh; 120 miles N. of Tobolsk.

PHILIDOR, ANDRÉ', in *Biography*, born at Dreux in 1726, was descended from a long line of musical ancestors, who, in different branches of the art, had been attached to the court ever since the time of Louis XIII. The family name was Danican; and it is pretended that this monarch, himself a dilettante musician, occasioned the surname of Philidor, a famous performer on the hautbois, whom this prince had heard in his progress through France, to be given to Danican, whose instrument being the hautbois, when the king heard him perform, he cried out "here's another Philidor!" Andrew was educated as a page or chorister in the chapel royal, under Campra, maître de chapelle. In 1737 he produced his first motet, or full anthem, which was performed in the chapel, and complimented by the king as an extraordinary production for a child of eleven years old. On his change of voice, and quitting the chapel, he established himself at Paris, where he subsisted by a few scholars, and by copying music; but every year he went to Versailles with a new motet.

The progress which he had made at chefs awakened in him a desire to travel, in order to try his fortune; and in 1745 he set out for Holland, England, Germany, &c. In these voyages he formed his taste in music upon the best Italian models. In 1753 he tried his strength as a musical composer in London, by new setting Dryden's ode on St. Cecilia's day. Handel is said, by his biographer, to have found his chorusses well written, but discovered a want of taste in his airs.

As his time was more occupied by chefs than music, he printed in London, at a large subscription, in 1749, his "Analysis of the Game of Chefs," *Analyse des Echec*. In 1754 he returned to Paris, in the month of November, and devoted his whole time to music. He had his "Laudæ Jerusalem" performed at Versailles; but it was found to be too Italian, and as the queen of Louis XV. disliked that style of music in the church, his hopes of obtaining, by this composition, a place of maitre de chapelle, were frustrated.

In 1757 he composed an act of a serious opera, but Ribel, opera manager, would not let it be performed, telling him that he would have no airs introduced in the scenes of that theatre.

In 1758 he produced some airs for "the Pilgrims of Mecca," at the comic opera; Corbi, the manager, proposed to him the undertaking to set an entire opera for that theatre; and the first drama he set was "Blaise le Savetier," Blaise the Cobler, which was performed at La Foire St. Laurent, in 1759, with the greatest success, and afterwards five more successful comic operas issued from his pen, among which "Le Marechal ferrant," or the Blacksmith, supported more than a hundred representations. In 1762, at the union of the Opera Comique and the Theatre Italien, he produced "Sanch Panca;" in 1763, "Le Bucheron," and a musical entertainment for the piece; in 1764, "Le Sorcier;" in 1765, "Tom Jones," which at first was hissed, but afterwards acquired great favour. In 1767 his serious opera of "Ernelinde" was performed at the great opera-house, which was the beginning of the revolution in the style of music at that theatre. In 1769 he set for the comic opera "Le Jardinier de Sidon;" in 1770, "Le Jardinier supplicé;" in 1771, the "New School for Wives;" in 1772, "Le Bon Fils;" in 1773, the "Navigator;" in 1775, "Les Femmes vengées;" and in 1779, in London, "The Carmen Seculare" of Horace.

In the conduct of this performance, Philidor placed himself under the guidance of Baretti. The performance was attended at Freemasons' Hall by all persons of learning and talents, in expectation of a revival of the music of the ancients, and, by many, of its miraculous powers. To what kind of music the "Carmen Seculare" was performed at Rome, we pretend not to say; but in London we could trace the composer's models for the chorusses in the oratorios of Handel, and the operas of Rameau; and for the airs in his own comic operas, and the favourite melodies then in vogue in that theatre, many of which, with Italian words, and Italian singing, particularly those of Gretry, would be elegant and pleasing music any where.

Philidor, however, in setting the secular ode, it must be confessed, manifested his knowledge of counterpoint in the style of the old masters; and that, in spite of chefs, he had found time for the serious study of music; we believe that no one found himself much the wiser concerning the music of the ancients after hearing this music performed to Latin words, than after hearing an oratorio of Handel, or an opera of Rameau. This miraculous chefs-player, and ingenious and pleasing composer of comic operas, died in London in 1795. Laborde.

PHILINUS, in *Medical History*, a physician, born in the island of Cos, was a disciple of Herophilus, and flourished in the thirty-eighth century, A.M. He was a distinguished member of the Empirical sect, of which, indeed, he divides the honour with Serapion, of Alexandria, of being esteemed the founder. He is said, by Athenæus, to have been the author of a treatise on herbs, and of some com-

mentaries on the works of Hippocrates. See Le Clerc, Hist. de la Med.

PHILIP II., in *Biography*, king of Macedon, was the third son of king Amyntas. In his youth he was sent, by his father, as a hostage to Thebes, where he was educated in the house of Polymnas, the father of Epaminondas. On the death of his brother Perdicas, he returned suddenly and secretly to Macedon, where he assumed the regency, as guardian to his infant nephew. It was, however, with the unanimous consent of the nation, then surrounded by enemies, and under circumstances of great difficulty, that he took upon himself the royal title and authority, in the year 360 B.C., being then in the 23d year of his age. His first measures were those of a prudent politician. By declaring Amphipolis free, he took away the chief cause of a war with the Athenians, who had sent an army in support of a competitor to the crown; and by presents distributed among the leading people of Pæonia, he prevented a war with that people. He next turned his attention to the essential point of new-modelling and disciplining his army, in which he applied the lessons of military art that he had derived from the Thebans. He very soon acquired the confidence of his troops, defeated Argæus, his competitor for the crown, invaded and subdued the Pæonians, and forced the Illyrians to submit to a treaty, by which they resigned all their conquests in the Macedonian territory.

Philip was a decided character, and he set out in life with a determinate object, of which he appears never to have lost sight, viz. the extension of his dominions, and the elevation of the kingdom of Macedon to that consequence among the Grecian states, which circumstances had hitherto prevented it from assuming. This purpose he steadily pursued, by policy or by force, as best suited the occasion, neither deterred by difficulties, nor moved by considerations of justice. One of his first offensive measures was an attack upon Amphipolis, to which city he had, by his treaty with Athens, renounced all claim. He took it by storm, banished or put to death such of the citizens as opposed his interest, and treated the rest with kindness. He next reduced Pydna and Potidea, the latter of which he gave to the Olynthians. He next acquired the country between the rivers Strymon and Nestus, rich in gold mines, and at that time possessed by the Thracians. He took Crenides, its principal town, the name of which he changed to Philippi; and instantly began to work the mines, which supplied him with a metal not less powerful in effecting his purposes than iron. The Phocian or sacred war occupying at this time the attention of all Greece, Philip was at liberty to pursue unmolested his plans of aggrandizement. Being desirous of subjecting Thrace, he determined to possess himself of Methone, a small city, incapable of supporting itself by its own strength, but which gave him much uneasiness, and obstructed his designs, whenever it was in the hands of his enemies. Accordingly he razed it to the ground. Here he lost one of his eyes. After Amphipolis had offered his services to Philip, telling him that he was so excellent a marksman, that he could bring down birds in their most rapid flight. "Well," said the monarch, "I will take you into my service, when I make war upon starlings." Stung with the reply, he resolved upon revenge. After having thrown himself into the city, let fly an arrow, on which was written, "To Philip's right eye." This carried the most unquestionable evidence as to his skill in shooting, for it hit the king exactly in his right eye. Philip ordered the arrow to be sent back, with the following label: "If Philip takes the city, he will hang Aster;" and he was as good as his word.

## PHILIP.

An invitation from the Thessalians, to come and restore order in their country, which the contentions in the family of the Pheræan tyrants had thrown into confusion, was gladly accepted by Philip, who, after some variety of fortune, totally defeated the forces of Lycophron, and his Phocian auxiliaries. It was a vast advantage to his designs, that he was able to engage superstition in his favour, by the decided part he took against the Phocians, whose seizure of the temple of Delphi had occasioned the sacred war. The jealousy of the Athenians, however, rendered of no avail his attempt to pass the Pyla, or defiles leading into Greece: he, therefore, bent his whole force to the humiliation of that powerful republic. He was not contented with hostile measures, but employed his gold to corrupt the venal orators of Athens, and would probably have obtained an ascendancy in the councils of the state, had it not been for the superior genius of Demosthenes. An attack upon the powerful republic of Olynthus was his next measure. The Athenians, roused by the eloquence of Demosthenes, sent succours to the Olynthians; but it was too late: Philip had, by corrupting two of its magistrates, gained possession of the city, with an immense booty. The two magistrates complained to Philip of the treatment they had experienced from his soldiers, who reproached them as traitors; to which the monarch replied: "You must not regard them; they are rustics, who always call things by their right names."

He was next solicited to put an end to the Phocian war; and with a large army passed the straits of Thermopylæ, entered Phocis, assuming the character of vicegerent of the god Apollo, whose sanctuary had been violated. The Phocians, not daring to resist, submitted to his mercy; and Philip, having referred the judgment of their cause to the grand council of Amphictyons, and executed their decree, marched back into Macedon. This event occurred in the year 348 B.C.

After this he marched against a Scythian prince, whom he totally defeated. Returning with a rich booty, he was refused a passage through the territory of the Triballi, a tribe of fierce barbarians, unless he would share his plunder with them. Disdaining this condition, he proceeded to force his way. An engagement ensued, in which he received a wound in the thigh, was thrown to the ground, and would probably have been killed, had he not been rescued by his son Alexander, then a youth. In the end he obtained a signal victory, and returned to Macedon in triumph.

A length, by a train of fortunate circumstances, he was enabled to march into Greece; and at Cheronæa, in the year 338 B.C., the battle was fought which put an end to the liberty of Greece. The confederates at first obtained some advantages, but were afterwards thrown into confusion by the Macedonian phalanx, and totally defeated with great slaughter. Philip's joy at this success for a time overcame the usual moderation of his character, and he indulged himself in ludicrous sarcasms against the Athenians, and insults to his prisoners, till he was recalled to reason by the manly reproof of the orator Demades, who told him, that when fortune seemed to have assigned him the part of Agamemnon, he ought not to dishonour himself by playing that of Theristes. He instantly checked his follies of wit, treated Demades as a friend, and released all the Athenian prisoners. At their requisition, he even restored to them their baggage, but not without humorously remarking upon the demand, "these people do not seem to think we have been fighting in earnest." He then sent ambassadors to renew the peace with Athens upon the most favourable terms; and after leaving a garrison in Thebes, he withdrew from Bœotia, without

doing any injury to the country. By this well-timed moderation he established his authority in Greece, much more effectually than he could have done by severity.

Philip was now at leisure to turn his thoughts to some other great object worthy of his ambition, and he determined to return upon the Persian empire the evils it had formerly inflicted upon Greece, and carry his conquests into the opulent regions of Asia. With this view he summoned a general assembly of the Grecian states, settled the terms of an universal peace, as it was called, and got himself acknowledged supreme chief of the nation, in the intended war against Persia. He fixed the quota of each state in the combined army, and then returned to Macedon, to make his own preparations. Shortly after, to pacify some family dissensions, he gave in marriage his daughter Cleopatra to the brother of Olympias, his divorced queen, and the mother of Alexander the Great. The nuptials were to be celebrated with great splendour at Ægæ; and at the same place and time he appointed the ambassadors of all the Grecian states to assemble, in order to partake of a grand entertainment before his departure for Asia. The concourse was prodigious, and all strove to surpass each other in demonstrations of respect and attachment to the effective sovereign of Greece. It happened that a young Macedonian, named Pausanias, had some time before received an injury from Attalus, the brother of Philip's second wife, and had sought redress of the king in vain. He resolved upon revenge, to which, it has been thought, he was excited by Olympias; the discarded wife of the monarch, and likewise by Darius the Persian. Philip, during the festivity, going in state to the theatre, with his guards at a distance, for the purpose of shewing the confidence he placed in his people, was suddenly stabbed to the heart by Pausanias, who had planted himself at the door of the theatre, and fell dead at his feet. The assassin was near escaping to his horse, but being accidentally thrown down, he was dispatched by his pursuers. Thus fell Philip, at the age of 47, in the year B.C. 336, "jull," says the historian, "as he was about, probably, to anticipate his son Alexander in those great exploits, which have given the latter such superiority of fame, though founded on the preparations made by his father: for had not Philip, by his extraordinary efforts of military skill and policy, first rendered himself master of Greece, his son would never have been in the condition to lead a conquering army into Asia."

Pausanias's body was immediately hung on a gibbet; but in the morning it appeared crowned with a golden diadem, the only method that Olympias had to express her resentment of Philip. In a few days after, she took occasion of giving farther proof of her triumph and exultation in Philip's fall, by causing the same funeral honours to be paid to the remains of Pausanias, which were prepared for Philip: both bodies were burnt on the same pile, and the ashes of both were deposited in the same tomb. Such was the commencement of the completion of Hermocrates' prediction, who being asked by Pausanias, "What that man should do, who wishes to transmit his name with lustre to posterity," replied, "He must kill him who hath achieved the greatest actions: thus shall the memory of the hero be joined with his who slew him, and both descend together to posterity."

In the character of Philip was a singular mixture of good and bad qualities. He was crafty and dissembling; he scrupled the use of no means of fraud or violence to obtain his purposes, and was occasionally rigorous to his enemies. At the same time, he had much kindness and benignity in his nature, was affable, social, liberal, and element; a kind  
master,

mafter, and generally a juft fovereign. He was himfelf learned, and a patron of learning. A variety of anecdotes are recorded of this prince, which redound greatly to his credit. Of thefe we fhall felect two or three, that fhew the greatnefs of his mind, in bearing patiently reproof from inferiors. It was his cuftom, as it had been that of his predeceffors, to adminifter juftice in perfon; but a love of conviviality would fometimes interfere with the more imperious calls of duty. Having feveral times told a woman, who came with a petition, that he was not at leiſure; ſhe at length loſt her temper, and replied, "If you have not leiſure to do juſtice, ceafe to be a king." Struck with the propriety of the reprimand, he inſtantly attended to her caſe, and gave redrefs. At another time, having given an haſty deciſion againſt a woman, upon riſing from a banquet, ſhe cried, "I will appeal." "To whom?" ſaid Philip. "To Philip ſober," ſhe replied. He reconfidered, and retracted his judgment. After his breach with his ſon, whom he had baniſhed from his court, being viſited by his friend Demaratus of Corinth, and aſking him if all was quiet in Greece; "You have reaſon, truly," he replied, "to concern yourſelf about the quiet of Greece, when you have filled your own family with ſtrife and diſorder." Philip took the reproof kindly, and recalled his ſon. Univer. Hiſt. Plutarch.

PHILIP V., the next of the Macedonian Philips who require to be noticed in our work, was the ſon of Demetrius II., who at his death, in the year 232 B.C. (ſee his article) left him, then but three years of age, in the tutelage of his uncle Antigonus Doſon. On the deceaſe of the latter, in the year 221, Philip took the reins of government into his own hands. At this time he diſplayed many qualities which gave promiſe of a happy and illuſtrious reign. He poſſeſſed quick parts, a ſolid underſtanding, and a retentive memory. He had been ſent by Antigonus at an early age into Peloponneſus, to ſtudy the art of government under that eminent patriot and ſtateſman, Aratus of Sicyon; and his uncle, upon his death-bed, had charged him to follow his counſels in every thing relative to Grecian politics. By the advice of Aratus, he joined the Achæans in the ſocial war between them and the Etolians; and ſoon after his acceſſion he departed for Greece, and arrived at Corinth. During the courſe of this war he diſtinguiſhed himſelf by his vigour and enterpriſe, and performed various brilliant actions. His miniſter Apelles, who was greatly in his confidence, abuſed that confidence, and was guilty of various acts of treachery againſt his ſovereign, for which, at length, he, his ſon, and ſome others, were put to death. The war continued ſome time longer to the advantage of Philip and his allies, till the ſucceſſes of Hannibal in Italy inſpired the young king with ambitious projects of extending his dominions, while the two powerful nations, the Romans and Carthaginians, were exhauſting each other. A peace was concluded among the Grecian ſtates, and Philip, after the battle of Cannæ, entered into a treaty offensive and defensive with Hannibal, who then appeared likely to turn the balance of empire in favour of Carthage. He now began to purſue a ſimilar plan of policy with that of his predeceſſor Philip II., and by fomenting diſturbances in the Grecian ſtates, endeavoured to bring them under ſubjection to himſelf; upon which, Aratus diſcovering the change in his character, withdrew from his court, and lived as a private perſon at Sicyon. Not long after, Philip employed, it is ſaid, one of his officers to adminiſter a ſlow poiſon to the venerable patriot; of the conſequences of which he died. From this period Philip was engaged in almoſt ineffectual wars, in which he ſhewed no want of courage and activity,

though he frequently failed in his enterpriſes; but in the year 197 B.C., Flaminius, the Roman commander, brought him to a general engagement at Cynocephalæ, which terminated in the king's total defeat, and reduced him to ſupplacate for peace. This was granted upon the terms, that he ſhould withdraw all his garrifons from the Greek cities of Europe and Aſia, which were to be left free; that he ſhould deliver up his priſoners and deferters, and all his decked ſhips; ſhould reduce his army; ſhould carry on no war beyond the limits of Macedon, without the conſent of the Roman ſenate; and ſhould pay a thouſand talents to the conquerors. His younger ſon, Demetrius, was to be ſent for education to Rome as a hoſtage. Such was the end of the projects for aggrandiſement, which had kept him in perpetual action from the period of his acceſſion to the throne. It was now his great object to make uſe of the peace he was compelled to keep, in recruiting his ſtrength for any favourable opportunity that might offer of reſuming his arms. He augmented his revenues not only by increaſing the taxes and cuſtoms, but by opening the old mines, and working new ones; and in order to repair the loſs of people ſuſtained in the wars, he promoted marriage among his ſubjects, and brought a great number of Thracians to ſettle in Macedonia. Having more confidence in them than in his other ſubjects, he had practiſed the violent and cruel policy of tranſporting the inhabitants of his maritime towns into the inland and remote diſtrict of Pæonia, and giving their houſes to be occupied by the Thracians and other barbarians. This and other tyrannical acts rendered him extremely unpopular, but a family diſſention, more than all other evils, embittered his declining days. To this we have already alluded in the article PERSES, in which we have ſhewn in what manner the king was impoſed on to agree firſt to confine, and then to put to death, his younger ſon Demetrius. The diſcovery of the fraud, which had been practiſed upon him, and of the innocence of Demetrius, threw him into a ſtate of grief and remorse, which almoſt deprived him of his reaſon, and he died miſerably in the year 178 B.C., at the age of 58, after having taken ineffectual meaſures to exclude his ſon Perſes from the throne.

PHILIP, Roman emperor, was an Arab, born at Boſtra in the Trachonitis, and the ſon, it is ſaid, of a captain of robbers, which circumſtance, however, does not, as an Arabian, prove him to have been of baſe extraction. It is probable he entered very early into the imperial ſervice. In the reign of the third Gordian, he was appointed to ſucceed him as prætorian præfect. This elevation was regarded by him as an immediate ſtep to the throne, and his firſt meaſures were directed to deprive the young emperor of the affection of his ſoldiers; and ſuch was his villainous ſucceſs, that by his intrigues, the army was induced unaniſouſly to demand Philip for their emperor, and Gordian was obliged to conſent to receive him: at once in the character of a colleague and tutor. He ſoon arrogated to himſelf the ſupreme authority, and finding that Gordian ſtill had many and warm adherents, he took care to have him removed, but in what manner is not known. To the ſenate he wrote, that the young emperor was dead of a diſeaſe. This happened in the month of March, A.D. 244. Philip was about forty years old at the time he came into poſſeſſion of the throne, and his firſt act was to declare his ſon, a child of ſeven years of age, his partner in the empire. His popular manners and mild adminiſtration gained him the attachment of his new ſubjects, and having provided for his ſecurity abroad, by placing his brother at the head of the Syrian army, and his father-in-law at that of the troops in Mæſia and Macedonia, he marched againſt the Carpians, a barbarous tribe

who infested the banks of the Danube. After defeating them, and obliging them to sue for peace, he returned to Rome.

The year 248 was regarded as the thousandth year from the foundation of Rome, and on this occasion Philip celebrated the secular games with great magnificence. These were the last celebrations of the kind, and they were succeeded in the following ages by the Christian jubilees. He likewise published an ordinance, by which he abolished that public licence of unnatural practices, which had hitherto subsisted even under the best emperors. Philip had thus far worn in peace the crown which he had acquired by the worst of crimes; but in the fifth year of his reign, a revolt was excited in the eastern provinces. To reduce the troops to submission, Philip obliged Decius, a senator of high reputation, much against his will, to accept the government of Pannonia and Mœsia. As soon as he arrived in that country, he was compelled by the soldiers to assume the imperial purple, and either led or followed the army to the confines of Italy. Philip marched to meet him with a more numerous, but less warlike body of troops. An engagement ensued near Verona, which terminated in the defeat and death of the emperor. His son also was killed by the prætorians as soon as intelligence of the event reached Rome. This event occurred in June 249.

It has been a matter of warm controversy whether Philip was or was not a Christian, not that his conduct would in any degree do honour to the religion of the meek and benevolent Jesus, but in order that it might be ascertained whether he was entitled to the honour of being the first Christian emperor. Dr. Lardner enters at large into this subject; he says, "Baronius, Huet, and some others, take the affirmative side of the question, others the negative. Tillemont says, it is not without difficulties, and Mosheim has done his utmost to perplex this question; and, the more to increase the difficulty, argues, that he might be a Christian secretly, though not openly." Having quoted his authorities on both sides of the question, he gives his reasons to prove that Philip was not a Christian, which are as follow: 1. That divers Christian writers say, that Constantine was the first Roman emperor that made a profession of faith in the Christian religion; 2. That all heathen writers are silent about the Christianity of Philip and his son; 3. That Philip celebrated the secular games at Rome, in the thousandth year of the city; 4. That the Philips were deified after their death. Upon the whole, therefore, says Dr. Lardner, "I can see no reason to believe that the emperor Philip was by belief or profession a Christian. There is no doubt, however, that he was a protector of the new faith, and shewed respect to its ministers." Origen addressed several epistles to him, his wife and mother, which are not preserved.

PHILIP I., king of France, son of Henry I., was born in 1052. At the death of his father in 1060, he was left under the guardianship of Baldwin, earl of Flanders, who administered the public affairs with much ability and wisdom till his death in 1067. Philip then, at the age of 15, was declared of age, and assumed the government. One of his first exploits was to enter Flanders with an army, to support the family of Baldwin's eldest son against the younger, but meeting with a defeat near St. Omers, he abandoned the cause. After this, he was involved in wars with William of England, called the Conqueror, and with these two kings commenced that rivalry between the English and French crowns, which subsisted so long, and with so much mutual loss and bloodshed.

After the death of William, Philip took little part in foreign affairs; he was naturally indolent and fond of plea-

sure, and a passion in which he became involved, occupied him with domestic disputes during many years of his reign. He had married Bertha, daughter of the count of Holland, by whom he had three children; but upon some disgust, he divorced her on the pretence of kindred, and married Bertrade, wife of Foulques, count of Anjou. In consequence of this irregularity, he was excommunicated by pope Urban II., and his subjects were discharged from their allegiance. He repented, was absolved, but fell into the same sin again, which produced a repetition of the punishment. At length Bertha died, and the marriage with Bertrade was at least connived at. To strengthen his authority, which had been greatly weakened by his own misconduct, he associated in the government, in the year 1104, his son, Lewis le Gros; but Bertrade, who had children of her own, rendered the situation of Lewis so disagreeable, that he withdrew to the court of England, where his mother-in-law made some attempts upon his life, which, however, he fortunately escaped, and obliged the unnatural queen to beg forgiveness of her crimes. Philip, after a long and inglorious reign of 48 years, died in 1108. The first crusade was undertaken in his reign, but though it was very popular, he took scarcely any part in it. Univer. Hist. Hist. of France, 1790.

PHILIP II., king of France, surnamed *Augustus*, son of Lewis the Young, was born in 1165, and succeeded to the throne on the death of his father, in 1180. Though but fifteen years of age, and under the nominal tutelage of the count of Flanders, he assumed the reins of government, which he managed during his whole reign with equal vigour and prudence. One of his first measures was to banish from his court the licentious players and buffoons who infested it; he next expelled from his kingdom all the Jews, who by their art and industry had possessed themselves of a large share of its wealth. Their ill conduct and extortions were made the pretext for this severity, but the true cause appeared in the king's seizure of all their immoveable property, and his cancelling all debts due to them from his subjects. He afterwards found it expedient to recall them, at the same time, by laws made for the occasion, setting some limits to their usurious extortions. The mercenary bands which had been engaged in the service of his father and the king of England, now committing great outrages in the kingdom, under the name of Brabançons, Philip sent troops against them, which cut off the greater part, and expelled the rest. The capture of Jerusalem, in 1187, roused the zeal of the western Christians, and a new crusade was set on foot by the pope. In consequence, the kings of France and England took the cross, and promised to suspend their differences. Their friendship was but short lived; a war between the monarchs ensued, and Henry of England was obliged to make a humiliating compromise, which he did not long survive. Richard, who succeeded to the English crown, agreed with Philip upon a conjoint expedition to the Holy Land, in which both seemed actuated by the generous spirit of chivalry. They met in the island of Sicily, and quarrelled about the king of that place. When the disputes were adjusted, they proceeded to the siege of Acre, which fell before them. New differences arose, and Philip returned to his own dominions in 1191. Soon after his return, Philip married Ingelburga, sister of the reigning king of Denmark, against whom, on the marriage night, he conceived a disgust, which induced him immediately to separate from her. Philip, on pretence of remote affinity, procured from some of his bishops a divorce, and he espoused Agnes, daughter to the duke of Merania. Upon the complaint of the king of Denmark, pope Celestin declared this marriage null,

## PHILIP.

null, and his successor, Innocent III., upon Philip's refusal to take Ingelburga again, laid the kingdom under an interdiction. The king, after some resistance, thought it prudent to come to terms with the court of Rome, and to take back his lawful wife, at least to let her enjoy the title of queen in a distant castle.

Philip now turned his thoughts to Normandy, which was possessed by John, king of England; and when the latter had rendered himself odious to the whole world by the murder of Arthur of Brittany, Philip summoned him as a vassal to appear at his court of peers, and upon his refusal, procured a sentence against him of confiscation of all his lands in France. This was not an act of mere form, for Philip proceeded against him with great celerity; and in a short time, availing himself of John's inactivity and cowardice, re-annexed to the crown of France the whole of the fine province of Normandy, after it had been three centuries detached from that crown. He carried war still farther, so that in a short time, of all the English territories in France, Guienne alone remained to that sovereign. In 1213, upon a quarrel between John and the pope, the latter declared the English crown vacant, and offered it to Philip, who accepted it, and made preparations for taking possession of it. John, however, by his mean and debasing concessions, made the pope his friend, and assumed a degree of vigour which was not supposed to adhere at all to his mind. He formed a new confederacy; fitted out a fleet, which gained a greater naval victory than almost any recorded in the English annals; 300 of Philip's vessels were taken, 100 were sunk, and almost 1000 more were burnt, to prevent their falling into the hands of the victors. Philip, however, compensated this disgrace by a signal victory, which he obtained at Bouvines, in Flanders, in 1214, over the confederate army. He was present in the action, and was exposed to great danger through his martial ardour. The count of Flanders and several other great men became his prisoners. This success did not prevent him concluding a peace with John for five years. After this, some attempts were made to fix the French prince, Lewis, on the throne of England, but the enterprise ended in the complete expulsion of the French from the island. Philip died in 1223, in the 59th year of his age. He was accounted, and very justly, one of the ablest and greatest princes of his line: he was equally eminent for civil and military qualities, and scarcely any French monarch made such additions to the power and dominions of the crown. He was the first who maintained a standing army, even during peace, and he introduced several improvements in the military system. He was a patron to learning, raised up useful edifices, made roads, built bridges, fortified the principal towns, and employed for the benefit of the country the great sums which he amassed by taxes and economy. For the great additions which he made to his kingdom, he was called *The Conqueror*. He was easy and affable in his manners, and though little scrupulous in his politics, was not devoid of principles of equity and generosity. As a general, his reputation at least equalled that of any of his contemporaries; and the ingenuity with which he invented a variety of warlike engines, for the destruction of the human race, may be either applauded or regretted. But the character of the hero was surpassed by that of the statesman; his policy extended the narrow limits of kingly power, and his successors on the throne of France were indebted to Philip II. for the grandeur to which they attained. Univer. Hist. Stockdale's edition of Campbell's Lives of the Admirals. History of France, 1790.

PHILIP III., king of France, surnamed *Le Hardi*, son

of Lewis IX., was born in 1245. He was with his father at Tunis at the time of his death, in 1270, when he succeeded to the regal title and dignity, and received the homage of the kings of Sicily and Navarre. He continued some time to carry on the war begun by his father with the Moors, in which he displayed so much courage, as to confer upon him his surname. At length he made an honourable peace, and returned to France. By the death of his uncle, the count de Poitiers, and his countess, without heirs, their domains reverted to the crown, consisting of part of Poitou, Auvergne, part of Saintonge, Aunis, and the county of Toulouse. Out of this secession, he made a present to the papal see of the county of Venaissin, which remained in its possession till the French revolution, which commenced in 1789, and which cannot even now be said to be terminated. Philip engaged in two wars concerning the succession to the crown of Castile, which produced no remarkable event, and which were terminated by the interposition of the pope. During his reign there happened the revolution in Sicily called the Sicilian vespers, in which his uncle, Charles of Anjou, lost his crown. The revolted were supported by Peter, king of Arragon, who claimed the kingdom of Sicily; but the pope excommunicated him, and conferred the title of king of Arragon upon the count of Valois, Philip's second son, and a crusade was declared against Peter. Philip, in support of his son's claim, entered Catalonia with an army, and took Gerona. The fleet was afterwards destroyed by that of Arragon, the chagrin of which, together with an epidemic disease, put an end to his life at Perpignan, in the year 1285, being the 41st year of his age, and the 16th of his reign. This monarch was the first who granted letters of nobility, that rank having previously been either hereditary, or derived from the possession of certain fiefs, or the profession of arms. He died regretted by an army which he had unsuccessfully commanded, and lamented by a people whom he had reluctantly impoverished. Univer. Hist. Hist. of France, 1790.

PHILIP IV., king of France, surnamed *Le Bel*, son of the preceding, was born in 1268, and succeeded to the crown in 1285, when he was seventeen years of age. He was already titular king of Navarre, in right of his wife Joan, heiress to that crown. Finding his affairs in a very disordered state, he was desirous of terminating the war in Spain, which he accomplished. The great rival of Philip IV. was Edward I. of England, who had done homage to the French king. Both sovereigns were high spirited, and in consequence of some acts of hostility, Philip demanded satisfaction, and cited his rival as a vassal before the parliament, to answer for the outrage. He did not appear, and Philip instantly proceeded to the arbitrary measure of confiscating all his possessions in France. Edward did not wish for a war, being already engaged in a contest with Scotland, and Philip obtained Guienne without resistance. The war which ensued in 1295 was carried on with vigour on both sides, in the course of which Philip became involved in the most serious disputes with the pope, Boniface VIII. who was unquestionably one of the most arrogant pontiffs of the Roman see. Philip had demanded a subsidy of his clergy, and the pope instantly issued a bull, prohibiting the clergy of every rank and order from paying any kind of tax to a layman, without permission of the holy see, and denouncing the awful penalty of excommunication against the defaulters, as well those who paid as those who received. Philip, on his part, forbade the exportation of money, jewels, goods, &c. out of the kingdom, without permission signed with his own hand. The pope, at length, ordered his legates to proceed to excommunication, but they

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were too prudent to comply without previous remonstrance, and the dispute was for the present compromised. Philip even consented to make the pope arbitrator between him and Edward; and his award was, that not only Guienne should be restored to the king of England, but that the earl of Flanders, who had been deprived of part of his kingdom in assisting him, should have it restored to him. The rancour still subsisting between Philip and Boniface, soon broke out with more fury than ever. The pope summoned the king to acknowledge that he held his temporal sovereignty from him, and he ordered the French prelates and doctors to assemble at Rome, for the purpose of holding a council. Philip was firm, and convoked the states-general of his kingdom, for the purpose of averting the blow aimed against his authority. The nobles, and the third estate, (now probably summoned for the first time,) warmly and decidedly supported the crown. The clergy temporized, and requested leave to go to Rome in conformity with the summons of the pope. The king and the barons joined in a prohibition; nevertheless, a number of them chose to obey the court of Rome rather than their king. The conclusion of this violent quarrel was, that the king was excommunicated by the pope, and his crown was offered to Albert of Austria, but Philip appealed to a future pope and council, and by the assistance of the Colonna family arrested Boniface at Anagnina, who escaped to Rome, where he soon after died.

During these transactions, a fierce war raged in Flanders, which country Philip had determined to unite to his own, and in the course of which the king defeated the Flemings in a bloody action, in which he displayed extraordinary valour at Mons-en-Puelle. He afterwards took Lille, but finding the enemy still numerous and obstinate, he concluded a peace on advantageous terms. These military transactions did not preclude Philip's attention to the reformation of internal abuses. For this purpose he rendered sedentary at Paris the parliament which had hitherto been ambulatory, and attached to the court, and from that time it became more properly a court of law. Benedict VI., who succeeded Boniface, had already absolved Philip from the censures of the church, and after his death Philip procured the election of Clement V., having first made him promise upon oath to do what he should desire. He accordingly revoked the bull of pope Boniface, which prohibited the clergy from paying taxes to the king without permission from Rome; granted him a tenth of their revenues for five years; annulled the declaration of the absolute sovereignty of the popes and finally was prevailed upon to consent to a judicial process against the memory of Boniface. The king's pecuniary wants led him more than once to the vile expedient of altering the standard of the coin, and it was raised in 1306 to triple the value it had borne under St. Lewis, to the great discontent of the nation. The same necessity produced a new expulsion of the Jews, with the confiscation of their property. A matter still more injurious to Philip's character was the cruel persecution which, in conjunction with the pope, he instituted against the Knights Templars. (See *TEMPLARS, Knights.*) Upon the most trifling evidence, the whole body of Templars throughout France were apprehended in one day, and committed to different prisons. Fifty-nine of them were burnt alive by slow fires, all asserting their innocence, and enduring their sufferings with the greatest constancy. The order was solemnly abolished by the pope, and all its property confiscated. The landed estates were conferred upon the order of Knights Hospitallers, since changed to that of Malta. Of the personal property, Philip took two-thirds by way of re-imbursment of the expences of the process,

which lasted some years. Philip was not without many domestic vexations: the wives of his three sons were accused, and two of them convicted, of adultery. These were sentenced to perpetual imprisonment, and their lovers, Philip and Walter de Laanay, severely atoned for the transports of illicit love: after suffering the torment of being flayed alive, they, with an usher of the chamber, the confident of their amours, were suspended on a public gibbet. The many troubles to which Philip was subjected threw him into a lingering decline, which put an end to his life, after an eventful reign of twenty-nine years, in the year 1314. Though avarice and cruelty have cast a shade over his talents and virtues, yet the vigour which he displayed in his contest with the pope, and the success with which he resisted the formidable thunders of the Vatican, must not be forgotten. He made great additions to the power of the crown, by his introduction of lawyers and their maxims of jurisprudence into the parliament, and by the consequence which he gave to the third estate, in summoning them to the states-general. He was an encourager of letters, and promoted the translation of several works into the French language. Univer. Hist. Hist. of France, 1790, vol. i.

PHILIP V., king of France, surnamed *Le Long*, was the second son of the preceding, and born in 1293. On the death of his elder brother Lewis, in 1316, he obtained the regency till the widow whom he left pregnant should be delivered. She brought forth a son, who lived but a few days, after which Philip was declared king of France, to the exclusion of Joan, the late king's daughter, who, however, inherited the kingdom of Navarre. Philip, by his firmness and attention to justice, quelled some disturbances that were about to break out in the provinces. His strict regard to his word had nearly impelled him to engage in a new crusade, to which he thought himself bound by having taken the cross with his father; but it fortunately suited the interests of the pope, whose see was at Avignon, to keep him in France. The Mahometans were apprized of the king's intention, and according to the common report, engaged the Jews to poison the wells, in which deadly work they were assisted by the lepers, a numerous body of that time, living in richly endowed hospitals. To this machination, of which there was no specific evidence, the credulity and prejudices of the age imputed an epidemic disease, that carried off vast numbers of the people; and the pretended conspiracy was punished with horrible executions, among which was that of 160 Jews in one burning pile, and with the confiscation of the estates of the hospitals of the lepers. After this, Philip finding himself in a state of tranquillity as to foreign affairs, meditated various reforms at home. One, which he carried into effect, was the exclusion of ecclesiastics from a seat in parliament, that they might not be diverted from their spiritual concerns. He had an enlarged mind for the times in which he lived, and planned an uniformity of coins, weights, and measures throughout France. From the counts of Valois, Clermont, and Bourbon, he purchased their claims of coinage within their own dominion; but though he carefully explained the benefits that would arise to the country, in general, from persevering in this undertaking, he found himself continually embarrassed by new and unexpected obstacles. The mind of Philip was too sensibly wounded by the injurious suspicions of his subjects; he beheld his honest endeavours productive of jealousy and disappointment; the violence of a fever only gave way to the mortal ravages of a dysentery, and after languishing about five months, he died in the sixth year of his reign. The historians of that credulous age have attributed his death to poison, but they all agree in acknowledging that

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that he constantly merited, though he was never able to acquire, the esteem and affection of his subjects. He is characterised as a wise, conscientious, public-spirited prince, pious without bigotry, and a great lover of learning.

PHILIP VI., king of France, surnamed *De Valois*, born in 1293, was son of Charles of France, count of Valois, and grandson of Philip le Hardi. At the death of Charles le Bel, in 1328, who left no male heir, but his wife being pregnant, the regency was disputed between Philip and Edward III. king of England, who was son of Isabella, sister to the late king. The title to the regency was in truth that of the succession to the crown, and it was adjudged to Philip, on the principle that Edward could not derive a claim through a female. The queen being, in a short time, delivered of a daughter, Philip assumed the title of king, and was crowned at Rheims with unusual pomp. His first great act was to restore the count of Flanders to that throne from which he had been expelled by his subjects for his attachment to the interests of France. The terror of his arms induced the Flemings to make their submission, and consent to the restoration of their count. The competition for the crown between Philip and Edward naturally left much ill blood, and Philip, to increase the difference, summoned Edward to do homage for Guienne and his other fiefs in France, who returned for answer, that it did not become the son of a king to humiliate himself before the son of a count. The threat, however, of confiscation of his revenues brought him very unwillingly to Amiens the next year, where he appeared with a magnificent retinue, and was met by Philip in equal state. After many disputes concerning the nature of homage, he was permitted to pay it in general terms. But after his return, a deputation was sent to England, which induced Edward to acknowledge that a liege homage was due to the king of France. He accordingly returned to France the next year, and was received by Philip with great respect, so that their amity seemed to be well established; but this was only in outward appearance, and an incident soon occurred which caused their secret animosity to burst into a flame. The count of Artois, after the death of the last count, had been adjudged to Maud, his daughter, in opposition to the pretensions of Robert d'Artois, Maud's nephew. Robert retired to England, and did not cease to urge the commencement of hostilities against Philip, who had proved himself inimical to his claims. In 1339 the war commenced. Edward, having made an alliance with the emperor Lewis of Bavaria, and also with Arteville, the brewer of Ghent, laid siege to Cambrai, but without success; and Philip, with a very numerous army, covered his frontiers so well, that his rival could obtain no advantage over him. At the same time the French fleet made great depredations on the English coast, took and burnt Southampton, and landed in various other places. These insults were however completely revenged the next year, by the great naval combat of Sluys, in which Edward in person destroyed half the French fleet with the crews. The war was continued with various success for several years. In the summer of 1346, Edward landed at La Hogue with 30,000 men, accompanied by his son, the Black Prince. They immediately began reducing the strongest cities in the neighbourhood, after which they spread fire and sword on every side, even to the very gates of Paris. All the efforts of Philip, who long kept the field, though wounded, were unable to turn the fortune of the day. The French were defeated, in the famous battle of Crecy, with a loss of men greater than the number of the whole English army, comprehending many of the principal nobility. In the course of this war France was re-

duced to the most distressful condition; the people disheartened and ruined by excessive impositions, famine desolating the country, and a pestilence raging in the capital. Fortunately for Philip, peace was as necessary for Edward as for him, and a truce was negotiated for three years. Philip now became captivated with the charms of the princess Blanche of Navarre, whom he had destined for the second wife to his eldest son, that he espoused her himself, and married his son to the widow of Philip of Burgundy, count d'Artois. The festivities on account of these nuptials were however very soon succeeded by mourning for the king's death, which happened in 1350, when he was in the 57th year of his age, and the 23d of his reign. He lived to lose the affections of his subjects, by whom he was once idolized, though his misfortunes rather than his faults were the occasion. Univer. Hist. of France, 1790.

PHILIP I., king of Spain, and archduke of Austria, son of the emperor Maximilian I., was born in 1478. A marriage between him and Joanna, daughter of Ferdinand of Arragon and Isabella of Castile, took place in 1496; and the death of her only brother, Don Juan, left Joanna the heiress of their vast dominions. In 1502, the archduke and his spouse visited Spain, where they were acknowledged by the Cortes as the lawful successors to the crown of that kingdom. In passing through France, Philip had done homage to the king, Lewis XII., for the earldom of Flanders, which he inherited in right of his mother, Mary, daughter of Charles the Bold, duke of Burgundy. The temper of Philip was ill suited to the solemnitatiness of the Spanish court, and notwithstanding the intreaties of his wife, who deoted on him, he hastily returned to the Low Countries. He now signed a treaty with Lewis, by which he hoped all differences between the crowns might be adjusted, but his father-in-law, Ferdinand, finding his affairs prosperous in Italy, paid no regard to it. Isabella died in 1504, and left the regency of Castile to Ferdinand, till her grandson Charles should come of age. Ferdinand was however obliged to resign the regency, and Philip was put in possession of the royal authority. The dislike which this prince always shewed to the Inquisition, and the preference which he gave to his Flemish favourites, began to produce alarming discontents, when death put a period to his reign, in the year 1506, at the age of twenty-eight. He is distinguished only as being the father of the emperor, CHARLES V., see his article. Univer. Hist. Robertson.

PHILIP II., king of Spain, son of the emperor Charles V., and Isabella of Portugal, was born in 1527. When he was only in his sixteenth year he was married to Mary, daughter to the king of Portugal, and at the same time his father, on leaving Spain for Germany, committed the administration of that country to him, with minute instructions for his conduct, and assigning him the duke of Alba as his counsellor in military affairs. No event of consequence happened under his regency in Spain, and in 1547, Charles being desirous of having him near his person, he consigned his authority to his cousin Maximilian, and embarked for Germany. In this progress, he acted the part of a great prince with a dignity suitable to his high rank, and gave a favourable impression of himself to all the distinguished personages in Italy and Germany, who were introduced to him on the way. He met the emperor at Brussels, and the states of the Low Countries formally recognized Philip as their future sovereign; and in all the towns which he visited, he was received with extraordinary rejoicings; but in the midst of these festivities he displayed a severity of disposition, and an exclusive attachment to his Spanish attendants, which inspired the Flemings with a permanent dislike.

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In 1550 he appeared with his father at the diet of Augsbürg. This was a step towards the scheme which Charles had much at heart, *viz.* that of procuring his son's succession to the imperial dignity. But independently of other obstacles, Philip's whole demeanor was so offensive to the Germans, that his presence only proved an additional impediment, and he was sent back to Spain. Mary of England having succeeded to the crown on the death of her brother Edward VI., Charles instantly thought of her as a fit wife for his son, who was now a widower. Philip, though much younger than Mary, agreed to the proposal, the marriage was agreed on, and Philip came over to England in 1554 for its celebration. He found the people wholly averse from the union: the parliament shewed its disapprobation by rejecting a motion that England should give aid to the emperor in his war with France, and they went farther, by refusing their consent to Philip's coronation as the queen's husband. Finding little satisfaction in this country, and being rather disgusted than gratified by his wife's importunate fondness, he withdrew to Flanders. In 1555 the emperor Charles resigned his authority and crown, and Philip at once rose from a subordinate station to that of the most powerful prince of Europe. At Brussels he received the full surrender of the sovereignty over that part of his dominions; and in a few weeks afterwards he was put in possession of the crown of Spain, and all its vast dependencies. The first measure of Philip as sovereign was to conclude a truce for five years with the king of France. This truce was broken in a few months by the French, and pope Paul IV., the avowed enemy of Philip, declared him to have forfeited the kingdom of Naples, which was a fief of the holy see. Philip had too much religion to take up arms against the head of the church, nevertheless, he found himself constrained to send his general the duke of Alva against him, to bring his holiness to terms, in which he soon succeeded. War was in the mean time renewed in the Low Countries, and Philip visiting England, used all his endeavours to engage that country to join him as an ally. Mary persuaded her ministers to declare war against France, and in the end she lost Calais: but Philip gained a great victory over the French at St. Quintin, in August 1557, and to mark his gratitude for the event, he built a church, a monastery, and a palace to the honour of St. Lawrence, on whose festival the battle was fought. The Escorial was the monument erected on this occasion. In the same year, Philip's superstitious fears induced him to grant a peace to the pope, upon terms more humiliating to himself than to the vanquished. In 1558 Mary died, and Philip made proposals of marriage to her successor Elizabeth, of whom he had been the protector, when her life was endangered by the jealous bigotry of her sister. She was, however, too well acquainted with Philip's disposition, and too sensible of the dislike borne him by the English nation, to listen to the proposal. In 1559 peace was concluded, which put an end to the long and destructive contest between the Spanish and French monarchies. In the course of that year he returned to Spain, and was treated by the Spanish inquisition with an *auto de fé* (see the article *ACT of faith*); and his devout behaviour at the burning of his wretched subjects, which shews the blackness and malignity of his heart, has been commended by Spanish historians, who were nearly as savage as the priests who performed the horrid deed. At this period those commotions began to prevail in the Austrian Netherlands, which produced the most memorable events in Philip's reign. The principles of the reformation had made great progress in those states, and Philip, equally despotic in his temper, and bigotted to his religion, was determined to use his authority to silence all

discontents. For the effectual suppression of heresy, he established a court of inquisition, on the model of that infernal one in Spain, and he retained a body of foreign troops in the country, to overawe opposition, notwithstanding the remonstrances of the states, who saw that the subversion of their liberties was the aim of his policy. It was the maxim of this tyrant, "that a king had better be without subjects, than be a king of heretics." At one time, however, he found it necessary to temporize, having against him a most formidable opposition, headed by the prince of Orange, and the counts of Egmont and Horn. He was, at the same time, in conjunction with the court of France under Catharine de Medicis, and her son Charles IX., laying a plan for the total extirpation of the Protestants. When this was matured, the persecution of the heretics was resumed; and in 1567, the crisis of tyranny and cruelty arrived in the mission of the detested duke of Alva, who was prepared with means, as extensive as his own heart was black, for crushing all resistance, and carrying into full execution the coercive plans of the Spanish court. The establishment of the bloody council, the execution of counts Egmont and Horn, with a multitude of others of inferior condition, were among the immediate effects of the duke of Alva's presence. Though Philip was, perhaps, only the remote cause of these evils, yet he never shewed any signs of compunction for the miseries which were occasioned under the sanction of his name and authority; and it is pretty certain the severest measures had his full approbation.

Philip was now doomed to domestic disquiet; his eldest son Carlos engaged in intrigues against his government, and being unsuccessful, he was driven to despair, and exhibited such marks of derangement, as to justify the king in securing him in a place of confinement. In a few months the prince died, but by what means is not known: some writers ascribe his death to the consequences of his own irregularities, and others have not scrupled to charge the king with being privy to it. This event took place in 1567. A revolt of the Moriscoes in Granada occupied the Spanish arms two or three years, and gave Philip much uneasiness; it was, however, concluded in 1570, and in the same year he married his fourth wife, the archduchess Anne of Austria. In 1571, the Spanish arms, in conjunction with those of the confederates, acquired great glory by the naval victory obtained under the command of Don John of Austria, Philip's natural brother, over the Turks at Lepanto. In the Low Countries the cruelties of Alva had excited such a determined spirit of resistance, that he ceased to be successful in his military enterprises, and was recalled in 1573. Requesens was sent to succeed him; and upon his death in 1576, the government was committed to Don John of Austria, with full powers to grant any terms for concluding a war already extremely burdensome, *except liberty of conscience*. On the death of Don John, in 1578, the prince of Parma succeeded to all his authority, and for some years proceeded in a career of success, which finally terminated in the recovery of the ten southern provinces to the crown of Spain. On the death of Sebastian, king of Portugal, Philip laid claim to the crown, and by the help of the bloody duke of Alva obtained the object of his wishes. The assassination of William, prince of Orange, in 1584, delivered him from an inveterate foe, and was the cause of indecent rejoicings at the Spanish court; but his son Maurice proved a still more formidable opponent. For some time causes of mutual complaint had subsisted between the courts of Spain and England, and in 1586, Elizabeth, seeing the imminent danger of the united states of the Netherlands, and impending hazard to her own crown and the Protestant religion, ventured to enter

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ter into an open treaty with them, by which she engaged to supply them with men and money. At the same time she sent sir Francis Drake with a powerful armament to attack the Spanish settlements in America. Philip retaliated by exciting an insurrection in Ireland, and by his well-known *Armada*; which see. The same political system of exciting civil disturbances among his neighbours, together with zeal for the Catholic religion, the principal supporter of which he affected to be thought, induced him to give his assistance to the famous league in France. He became the avowed enemy of Henry IV. a declared Protestant, and even after he had renounced his faith he continued his hostility, and employed his influence at Rome to retard that king's absolution as long as possible. This conduct produced a declaration of war from Henry in 1595, which was carried on with various success. In the mean time war continued with England, in which Spain suffered the severest disasters. Philip, at length, broken by disappointments and infirmities, was desirous of restoring tranquillity to his kingdom, and in 1597, peace was concluded between France and Spain, but he survived it only a few months. When he found his end approaching, he caused himself to be conveyed from Madrid to the Escorial, where he died in September 1598, in the 72d year of his age, and the 43d of his reign. His character has been fully displayed in the account of his conduct and actions. He had sagacity to discover, and wisdom to employ, men of abilities: he was a friend to learning and the arts, where they did not interfere with his religious prejudices. His domestic administration was in some respects laudable, but his boundless ambition and bigoted principles rendered his whole reign a period of war and contention, and wasted the vast resources which he possessed, without effecting any of the great objects at which he aimed, and the Spanish monarchy dates its decline from his reign. Univer. Hist. Robertson and Hume.

PHILIP III., king of Spain, son of the preceding by Anne of Austria, was born at Madrid in 1578; of course he was in his 21st year when he succeeded to the crown. He had the character of a virtuous prince, but was very deficient in those talents that seem necessary to the well-governing of a great state. He almost immediately married Margaret of Austria; and as soon as James I. ascended the English throne, overtures of accommodation were made on the part of Spain, which terminated in a peace between the two kingdoms in 1604. The war with the Dutch states continued, but so little hope remained of a final recovery of these provinces, that a truce negotiated with the United Provinces as an independent government was concluded in 1609. In the same year a measure was adopted which inflicted a deep wound on the population, the wealth, and the industry of Spain. This was the total expulsion of the Moriscoes, of whom a great number was still remaining in the southern provinces, which they rendered rich and fertile: They were charged with being the enemies of Christianity, and with holding a traitorous correspondence with the Moors of Barbary, and other foes of the state. The barons, their landlords, who regarded them as very profitable tenants, denied the truth of the charge. The influence of the clergy prevailed, and the Moriscoes, to the number of 400,000, were expelled from all the provinces of Spain, upon a very short warning, and under circumstances of great injustice. An edict, conferring honour and exemptions upon all who would engage in agriculture, was intended to remedy the mischiefs of this measure, but skill and industry are not to be created at the pleasure of a minister, and Spain to this day feels the loss of her ablest cultivators. A double marriage between Philip's eldest son, the prince of Asturias,

and Isabella, sister to Lewis XIII. of France; and between this monarch and the infanta of Spain, concluded in 1614, was one of the great political events of this reign. Philip died in 1621, of a morbid melancholy, said to have been occasioned by the mal-practices of his prime minister; but others impute it to a circumstance of court etiquette; a brazier placed so near as to incommode his majesty could not be removed for want of the presence of the proper officer, till he had received a serious injury from the heat. Univer. Hist.

PHILIP IV., king of Spain, son of the preceding, by Margaret of Austria, was born in 1605, and succeeded his father in 1621. He immediately gave the reins of government to his favourite the count d'Olivares, who was his confident and minister of his pleasures. By his persuasions the young king assumed the title of Great, which few monarchs have less deserved. Forming a strong alliance with the emperor of Germany, he re-kindled a war in Italy, in the hope of establishing the Spanish influence in that country, while the French were occupied with intestine troubles, which Olivares secretly fomented. The secret hostility between the two crowns terminated in open war in 1635, the events of which were in the beginning favourable to Spain; but fortune at length turned, and in addition to various disasters by sea and land from the enemy, two very serious internal calamities distressed the Spanish court. A plan formed for abolishing the privileges of particular provinces, was tried in Catalonia with such ill success, that in a furious revolt the viceroy was killed, and the whole province broke out into open rebellion. In the same year, 1640, Portugal threw off the yoke of Spain, and placed the duke of Braganza upon the throne, which had been occupied by his ancestors. This and other misfortunes induced the king to dismiss his minister, and Olivares was disgraced. Affairs were little improved under the new administration. Massaniello's revolt at Naples, in 1646, augmented the confusion; but on the other hand a provisional treaty of peace signed with the Dutch, freed Spain from one of the most troublesome wars it had ever experienced. The peace was finally ratified in 1648. Barcelona, with the greatest part of Catalonia, were recovered in 1652; but the junction of Cromwell with France, the successes of Blake against the Spaniards at sea, and their defeats in the Low Countries, and on the frontiers of Portugal, rendered the Spanish court sincerely desirous of a general peace, and in 1659 the famous treaty of the Pyrenées was concluded. The kings of Spain and France had an interview in the isle of Pheasants, on the confines of the two kingdoms, where they signed the peace, and Lewis received for his bride the infanta, Philip's daughter. The war for the recovery of Portugal still continued; but by a total defeat of the Spanish general in the plain of Montes Claros in 1665, the cause of Spain was rendered hopeless. Philip fainted away on receiving the news, and in the September of the same year he died, after a reign of 44 years. The prince did not want for talents, and would probably have done honour to his high station, had he fallen into good hands while he was young; but an early introduction to licentious pleasures, and subjection to an ambitious favourite, who diverted him from all attention to business, rendered his reign inglorious to himself, and disastrous to his kingdom. Univer. Hist.

PHILIP V., king of Spain, born in 1683, was second son of Lewis, dauphin of France, and bore the title of duke of Anjou. He succeeded Charles II., and was proclaimed king of Spain at Fontainebleau, and at Madrid in November 1700. He arrived in his new kingdom in the beginning

## PHILIP.

ginning of the following year, and married the daughter of the duke of Savoy. At first every thing seemed to promise a quiet accession and prosperous reign, but a storm was secretly rising, which soon dissipated these flattering appearances. Several of the European powers, jealous of the influence which France would acquire over the Spanish counsels under a French prince, made a league to place the archduke Charles on that throne. Into this grand alliance entered England, Holland, and almost all the German princes, with the emperor, and it was afterwards joined by Portugal and Savoy. Philip gave an opportunity for forming a party against him in Spain, by a journey into Italy to appease a revolt in Naples, and to take possession of the duchy of Milan. He was present with the duke of Vendome at the battle of Luzzara, where he gave proofs of great personal courage. Returning into Spain, he found that disaffection to his cause had made alarming progress; and the archduke Charles was publicly declared king of Spain, at Vienna, in 1703. An English fleet conveyed him the next year to Portugal, and he now found that he had an arduous contest to sustain for his crown. The war of which Spain then became the seat, was attended with various vicissitudes of fortune. Gibraltar was taken by a coup-d-main by the English, and a formal siege for its recovery proved fruitless, as all have done since. In 1705 Barcelona was taken by the allies, and was thenceforth the seat of king Charles's government. The allied army penetrated to Madrid, of which it took possession. Philip, however, very soon recovered the capital, which was much more attached to him than to his competitor. The war was continued with various success till 1710, when the duke of Vendome arrived from France to take the command, and his ability soon changed the face of affairs. This general, accompanied by Philip, made prisoners of general Stanhope and all his army, and defeated count Staremberg. From this time Philip maintained a decided superiority, and when, in 1712, the congress for a general peace was opened at Utrecht, Charles withdrew from Catalonia, and the crown of Spain was no longer contended for. Philip, on his part, signed an act of renunciation for himself and his successors to all right of inheritance to the crown of France; and the states of the kingdom settled the succession to the Spanish throne upon the male descendants of Philip, in preference to the females, though nearer in blood. Peace was concluded in 1713; but Barcelona held out till taken by marshal Berwick in 1714. Philip had gone through this contest for a crown with a considerable share of reputation, though it was evident, that he was rather formed to be governed than to govern. In military transactions he committed the whole direction to the general officers, contented with giving the support of his presence. The affairs of Spain were soon put into the hands of the minister Alberoni, the confidant of Philip's second queen, Elizabeth Farnese, princess of Mantua. The politics of that enterprising projector involved Spain in new troubles. He took possession of Sardinia in 1717, and of Palermo in Sicily, and would have conquered the whole island, had not the neighbouring powers taken the alarm. A confederacy was formed against him by France, England, and Holland: sir George Byng destroyed the greater part of the Spanish fleet, and Philip was obliged, in 1720, to part with his minister Alberoni, as the condition of peace. Soon after this he fell into a morbid melancholy, which, without affecting his intellectual faculties, had such an effect upon his temper and habits of life, as denoted a total derangement. Though in perfect health, he would keep to his bed for months together, transacting business at hours the opposite to those which he

had usually kept. He sometimes imagined that he was dead, and asked why they did not bury him. Nothing was found effectual in soothing his mind, and rendering him at all manageable, but music, and the celebrated singer Farinelli, who was retained about his person, became a most important character at court. At length, in 1724, he abdicated the throne in favour of his eldest son Lewis. The young king dying in a few months of the small-pox, Philip was persuaded to resume the sceptre. His melancholy in a great measure disappeared, and he applied himself diligently to affairs of the state, especially to improving the administration of justice, and encouraging manufactures, arts, and sciences. In the war of 1733, he joined France against the emperor and the infant Don Carlos, conquered Sicily and the kingdom of Naples, which were ceded to him at the peace of 1736. In 1739 a maritime war broke out with England, on occasion of the right of search claimed by Spain in the American seas. Philip did not live to see the end of this, dying in 1746, at the age of 63, after a reign of 45 years. His character has been thus drawn: "If he was placed in a situation out of the reach of danger, he quietly remained there; if circumstances brought him in the midst of the warmest fire, he preserved the same phlegm, and amused himself with the fears of those about him. He was easy with his servants, familiar and good-humoured to those about him; but his qualities were rather passive than active, and his attachments were more the result of habit than sensibility. He was devout; but his devotion consisted in minute punctilios; he was conscientious, and narrowly scrupulous. Timid, reserved, and taciturn in public, he observed characters and actions with judgment and accuracy, but suffered things to take their course." Univer. Hist.

PHILIP, duke of Burgundy, surnamed the *Good*, was born at Dijon in 1396. After the death of his father, in 1419, Philip, who succeeded him to the dukedom, joined the party of the English under Henry V., and assisted in carrying desolation through France, during the close of the reign of Charles VI. and the beginning of the reign of Charles VII. In 1435 he was reconciled to the king of France by the treaty of Arras, and became one of the most powerful and wealthy sovereigns of his time, having united to the duchy of Burgundy almost the whole of the seventeen provinces of the Low Countries. When the dauphin Lewis, afterwards Lewis XI., quarrelled with his father, and withdrew to the dominions of Burgundy, Philip gave him an hospitable reception, but refused to assist him in making war upon his father. The duke's son, the count de Charolois, afterwards Charles the Bold, was of a fiery disposition, and not likely to accommodate himself to the disposition of their guest. On the accession of Lewis, the duke and his son were present at his coronation, and every thing seemed, at first, to denote peace and amity, but some pernicious conduct of Lewis caused the count de Charolois openly to join in the "league for the public good," against him, in which he was countenanced by his father, who resigned to him the administration of his state. He died at Bruges in 1467, leaving behind him the character of a wise and generous prince, who had promoted the prosperity of his subjects. He instituted the order of the Golden Fleece. Univer. Hist.

PHILIP, duke of Orleans, regent of France, the son of Philip, brother of Lewis XIV., by Charlotte Elizabeth of Bavaria, was born in 1674. From a child he manifested great quickness of parts, with a boundless curiosity, and a capacity for almost every kind of acquirement. His preceptor, St. Laurent, a man of real principle and great merit,

merit, unfortunately died before his education was finished, and he fell into the hands of the abbé Dubois, who entirely subverted his moral habits, and he gave himself up to open profligacy; yet he was naturally humane, frank, brave, and affable. He had a great share of penetration and sagacity, and would probably have made a shining figure in any kind of business, had not indolence and the love of pleasure destroyed in him all constancy of pursuit, and firmness of character. His chief application was bestowed on the arts, and he was a practiser, as well as an amateur, of painting, music, chemistry, and mechanics. He made his first campaign, as a military man, in 1691, under marshal Luxembourg; and in the following year commanded the reserve at Steinkirk, where he received a wound. In the same year he married a natural daughter of the king by madame de Montespan, a degradation to which he was persuaded by Dubois. After passing some years during peace in a round of pleasures, and varied studies, he was sent, in 1606, to command in Piedmont the army that was besieging Turin. When prince Eugene approached, for the purpose of raising the siege, it was the advice of the duke of Orleans to march out of the trenches to meet him; but the commander-in-chief was of a different opinion. In the rout that ensued, the duke received two wounds, and was obliged to recross the Alps in great disorder. In the following year he went into Spain, and arriving immediately after the battle of Almanza, profited by that victory in the reduction of Valencia and Arragon, and took Lerida in Catalonia. A prospect of the reformation of Philip V. of Spain, to which we have already referred, induced the duke to engage in some intrigues, for securing the crown of that country for himself. They were discovered, and his intentions defeated. Lewis, by his will, had nearly deprived him of all authority, though the power of the regency naturally fell to him; but soon after the monarch's death, the will was set aside by the parliament of Paris, and the regent was established in his full rights. He began his administration well, and shewed that his ideas of government were just and liberal; but an indolence, almost become natural to him, led him to devolve all the cares of his office to Dubois, the most unprincipled of men, and a total change from the manners and politics of the old court immediately took place. To bigotry and devotion succeeded open impiety: to form and decorum, ease and licentiousness. A political connection was established with the English cabinet under George I., which suited the personal interests of both the king and the regent. The former was conscious that he was far from being firmly seated on his throne; and the latter had reason to apprehend that, in case of the death of the minor king, a claim would be advanced by Philip, king of Spain, notwithstanding his solemn renunciations. Indeed Philip's minister, Alberoni, excited a conspiracy in France, to deprive the duke of Orleans of the regency, and gain it for his master. This led France to join in a confederacy with the maritime powers, to defeat the projects of this minister, and remove him from his station; which they effected. The regent gave all confidence to Dubois, whom he created counsellor of state, and then minister and secretary for foreign affairs; after which, to the scandal of all order and forms of religion, he raised this libertine to the archiepiscopal see of Cambrai, and obliged the pope to create him cardinal. The derangement of the finances induced the regent and his minister eagerly to adopt the delusive projects of the famous LAW, (see the article,) which occasioned an unheard-of ruin to vast multitudes, and many unjust and arbitrary proceedings, which rendered the government odious. Dubois died in 1723, and from that time the regent took the cares of prime minister.

ter into his own hands; but his indolent habits rendered him unfit for business, and he soon abandoned it to his secretaries of state. Exhausted by the vicissitudes of public cares and private debaucheries, he died in December 1729, being in the 50th year of his age. The agreeable qualities of the duke have caused his memory to be treated with an indulgence to which he was not entitled. Vice, when allied with wit and good humour, is too easily pardoned. In the character of the duke of Orleans there was little respectable, to balance much that was contemptible, and even detestable. Duclos says of him, "Good and bad treatment, services and offences, moved him slightly; he gave, but did not recompense; he readily pardoned, seldom esteemed, and still seldomer hated." He was, in truth, long before he died, sunk in the grossest debauchery, which proceeded to lengths that shocked even the licentious. He was suspected of regarding his daughter, the duchess of Berry, with more than paternal fondness; at least, it is certain that he initiated her in the loosest principles: and as a public man, he may be said to have lastingly injured the morals of the nation, and destroyed its credit.

*PHILIP Islands*, in *Geography*, two islands in the South Pacific ocean, discovered by captain Hunter in the year 1791, on his return from New South Wales to England. He describes them as joined together, or nearly so, by a long sandy spit, above water, which reaches for about two-thirds of the distance from the eastmost or largest island to the westmost, which is small. A sand bank above water encompasses the largest, and extends from the foot of the higher land about half a mile into the sea. A few natives were seen on the shore as the ship passed by it. These islands are dangerous to navigators in the night, on account of the sandy spits which project from them: they were covered with shrubs, and had but few tall trees among them, and the land is low. The largest is in S. lat. 8° 6'. E. long. 140° 3'. They were computed to belong to the New Carolines, but they seemed to be wholly detached, and are about five miles asunder. Captain Hunter called them Philip islands in honour of Arthur Philip, governor of New South Wales.

*PHILIPPEAU*, an island, 24 miles in circumference, situated in the N.W. part of lake Superior. N. lat. 48° 12'. W. long. 88° 58'.—Also, a bay of the gulf of St. Lawrence, near the straits of Belleisle. N. lat. 51° 20'. W. long. 55° 40'.

*PHILIPPEVILLE*, a town of France, in the department of the Ardennes, and chief place of a canton, in the district of Rocroy; 12 miles N.W. of Givet. It was anciently called "Corbigny," until Mary of Austria fortified it in 1577, when it received its present name, in honour of Philip II. king of Spain. The place contains 1202, and the canton 4880 inhabitants, on a territory of 155 kilometres, in 13 communes.

*PHILIPPI, HENRY*, in *Biography*, a learned Jesuit, a native of Luxembourg, was born in the vicinity of St. Hubert's, in the Ardennes, in the year 1575. He commenced his noviciate in the order of Jesus at the age of 21, and quickly surpassed all his contemporaries in the several departments of academical learning; but he was particularly versed in scriptural history and chronology. Having been admitted to the degree of doctor of divinity, he taught philosophy, scholastic divinity, and biblical literature, in the universities of Gratz, Vienna, and Prague. After this he was appointed tutor and confessor to Ferdinand III., king of Hungary and Bohemia; in whose service he died, at Ratibon, in 1636, about the age of 61, while attending his royal pupil at the diet which elected him king of the Romans.

He was author of a great number of works, among which are the following: "Chronologica Synopsis sacrorum Temporum," 1624; "Manuale Chronologicum veteris Testamenti," 1635; "Chronologia veteris Testamenti accuratum Examen," 1637, &c.

**PHILIPPI**, in *Ancient Geography*, a town of Macedonia, at a small distance towards the E. from mount Pangæus, near the sea. Its first name was Credinas, and since Datus. It occupied the summit of a small eminence. Philip, the father of Alexander, having taken possession of it, fortified it and gave it his own name. The Romans established in it a colony. It was situated on the great route from Thessalonica. It is mentioned in the Acts of the Apostles. St. Paul preached here and wrought miracles; and addressed an epistle to its inhabitants. Some have thought that it was on a plain near this town that Brutus and Cassius were defeated.

**PHILIPPI**, or *Theffalia Philippi*, the town of Thebes, in Theffaly. This name might possibly have been given to a town bearing a different appellation. It appears, however, that the battle between Brutus and Cassius on the one side, and Augustus and Mark Antony on the other, was fought here.

**PHILIPPI Insula**, an island of the Arabian gulf. Strabo.

**PHILIPPI**, in *Geography*, a town of European Turkey, in Romania; 25 miles S. of Emboli.

**PHILIPPIANS**, *Epistle to the*. See **EPISTLE**.

**PHILIPPICS**, **PHILIPPICÆ**, *ἐπιτεπικὸι λόγοι*, in *Literature*, a name given to the orations of Demosthenes against Philip, king of Macedon; the design of which was to rouse the Athenians to guard against Philip, whose growing power and crafty policy had endangered and soon after overwhelmed the liberties of Greece.

The Philippics are esteemed the master-pieces of that great orator: Longinus quotes abundance of instances of the sublime from them; and points out a thousand latent beauties therein. In effect, that pathetic in which Demosthenes excelled, the frequent interrogations and apostrophes with which he attacked the indolence of the Athenians, where could they be better employed? How much delicacy soever there be in the oration against Leptines, the Philippics have yet the advantage over it, were it only on account of the subject, which gives Demosthenes so fair a field to display his chief talent, we mean with Longinus, that of moving and astonishing. See several appropriate extracts in Blair's Lectures, vol. ii.

Dionysius Halicarnassæus ranks the oration on the Halonese among the Philippics, and places it the eighth in order; but though the authority of that great critic be of no small weight, yet that force and majesty by which Cicero characterises the Philippics of Demosthenes, seem to exclude the oration on the Halonese out of the number; and authorise the almost universal opinion of the learned, who reject it as spurious.

Libanius, Photius, and others, but above all the languidness of the style, and the lowness of the expressions, which reign throughout the whole, father it on Hegesippus.

**PHILIPPIC** is also applied to the fourteen orations of Cicero against Mark Antony. It was Cicero himself that gave them this title in his epistle to Brutus; and posterity have found it so just, that it has been perpetuated to our times.

Juvenal, Sat. x. calls the second the *divine Philippic*, and witnesses it to be of great fame, *conspicua divina Philippica fama*. That orator's intitling his last and most valued orations after the Philippics of Demosthenes, shews the high opinion he had of them.

Cicero's Philippics cost him his life; Marc Antony having been so irritated with them, that when he arrived at the triumvirate, he procured Cicero's murder, cut off his head, and stuck it up in the very place whence the orator delivered the Philippics.

**PHILIPPINA**, in *Geography*, a town of Mexico, in the province of Guatimala. N. lat. 12° 50'. W. long. 91° 30'.

**PHILIPPINE**, a town of Flanders, situated on an arm of the Scheldt, and strongly fortified; 15 miles E. of Sluys.

**PHILIPPINE Bay**, or *Babia de Coils*, a bay on the S. of Cuba. N. lat. 22°. W. long. 83° 30'.

**PHILIPPINES**, or *Philippine islands*, a large group of islands in the East Indian sea, discovered by Magellan or Magalhaens in 1521, and called by him the Archipelago of St. Lazarus, on one of which he lost his life, after having taken possession of them in the name of the king of Spain. They were afterwards called the Philippines in honour of that infamous tyrant Philip of Spain. The popular name of Manillas is, in the opinion of Mr. Pinkerton, preferable, as native and ancient. Philip II. soon after his accession to the throne, founded a scheme for planting a colony in these islands, which had been neglected since the time of their discovery; and he accomplished it 1564, by means of an armament fitted out for New Spain. Manilla, in the island of Luzon or Luzonia, was the station chosen for the capital of this new establishment. The chief islands of this group are Luzon, the capital of which is Manilla, Mindanao, Palawan, Mindoro, Pani, Buglas or isle of Negroes, Zebu, Leyt or Leita, and Samar or Samal. On the coast of Zebu is the small isle of Mactan, where the celebrated navigator Magellan was slain. See an account of these islands under their respective names. The other little islands might be counted by hundreds. This great and extensive group presents, in general, many volcanic appearances, and most of the isles abound with lava and volcanic glass, sulphur, and hot springs; or, at least, thus they are described by the French writers. They present wild boars, deer, and useful animals of various kinds; and among vegetables the bread-fruit must not be forgotten, which fruit appears on the eastern coasts of Sumatra, and thence extends its benefits through innumerable islands in the Indian and Pacific ocean.

**PHILIPPINES**, *Neco*. See **PELEW Islands**.

**PHILIPPINES**, *Company of the*, a commercial establishment in Spain, which succeeded the Caraccas company, and absorbed their capital. This company took its rise in the year 1785, with a capital of 1,200,000*l.* and with valuable privileges granted to it for 25 years. Previously to this establishment, two ships sailed annually, one from Acapulco, a seaport of Mexico, and crossing the Pacific ocean, carried the treasures of America to the Philippines; the other, returning by the same course from Manilla, the capital of Luconia, came to Acapulco, where it was met by vessels from Lima, loaded with cacao, quicksilver, and hard dollars; in barter for which the merchants sent back china ware, spices, perfumes, silk, calicoes, muslins, and printed linens, the produce of the east.

When the Philippine company began its operations, this traffic ceased; and now, under the specious idea of saving time, with freight and insurance, required in conveying the gold and silver, but chiefly silver, of Peru and Mexico, by Europe to the east, these precious metals are sent directly westward to the place of their final destination, whilst the most bulky and perishable produce of the east, to the same amount in value, is diverted from its former course, and  
made

made to describe, in the opposite direction, that segment of the circle, which had anciently been traced by the silver and the gold.

The Philippine islands, almost innumerable, and cast up by volcanoes, are healthy, fertile, and, beside all the grains of Europe, produce gold, copper, iron, ship-timber, hemp, alum, saltpetre, cattle, hides, sago, rice, raisins, cacao, sugar, tobacco, wax, fish, and couries, which are the money of Hindoostan. These, with the silver, indigo, and cochineal of America, the company barter with the merchants of Asia for muslins, cottons, silks, spices, tea, quick-silver, and china ware, which, with the superabundant produce of the islands, are now brought by the Cape of Good Hope to Europe, and are admitted under easy duties into Spain with a drawback of one-third on their exportation.

But the hopes which this beneficial trading establishment excited soon vanished, and like other monopolies, the advantages resulting from it became of no long duration.

**PHILIPPISTS**, in *Ecclesiastical History*, a sect or party among the Lutherans; the followers of Philip Melancthon.

That reformer having strenuously opposed the Ubiquists, who arose in his time; and the dispute growing still hotter after his death, the university of Wittenberg, who espoused Melancthon's opinion, were called, by the Flacians, who attacked it, Philipists.

**PHILIPPOPEL**, in *Geography*. See **FILIPPOPOLI**.

**PHILIPPOPOLIS**, in *Ancient Geography*, a town in the interior of Thrace, according to Ptolemy, who says that it recognized Philip, the son of Amyntas, for its founder or its restorer. It was situated on the Hebrus.—Also, a town of Arabia, mentioned in the acts of the council of Chalcedon.

**PHILIPPOW**, in *Geography*, a town of Lithuania; 40 miles W. of Grodno.

**PHILIPS**, **AMBROSE**, in *Biography*, an English poet, was born of a Leicestershire family in 1671. He was educated at St. John's college, Cambridge, where he obtained a fellowship, and took deacon's orders. He attached himself to the Whig party, and obtained an introduction to Addison and Steele. He had already made himself known by his poetical compositions, and in 1703 he dates a copy of verses from Utrecht; but his situation or object at that place is not known. In 1709 he was at Copenhagen, where he was probably in some public capacity. From this place he wrote his much admired lines to the earl of Dorset. On his return, he found his friends out of power, and he employed himself in translating Persian tales for Tonson the bookseller. In 1712 he appeared as a dramatic writer, in his tragedy of "The distressed Mother," which was acted with great applause at Drury-lane, and which is still in reputation as a stock play. The literary distinction that he had now obtained was probably the cause of an exaggerated compliment from Tickell, which eventually exposed him to ridicule and mortification. That writer, in a paper of the Guardian upon poetry, made the pastoral pipe descend in succession from Theocritus to Virgil, Spenser, and Philips. Pope, who found his own juvenile pastorals undervalued, sent to the same periodical paper a comparison between his own and those of Philips, in which he ironically gave the preference to the latter. Addison detected the purpose, and the pastoral reputation of Philips was ruined. From this moment open hostilities were declared between the two poets, envenomed by the double power of party and rivalry. At the accession of George I., Philips was made one of the magistrates for the city of Westminster; and he applied to

Addison, then secretary of state, for another place, who told him, that he was considered as already provided for by his office as justice; to which he indignantly replied, that "though poetry was a trade he could not live by, he scorned to owe his subsistence to another that he ought not to live by." In 1718 he was editor of a periodical paper, called "The Freethinker," in which he had several respectable coadjutors. It was printed collectively in three volumes, but has long since been forgotten. After this he brought out two more tragedies, *viz.* "The Briton," and "Humphrey Duke of Gloucester," which were well received. In 1724 he accompanied, in quality of secretary, his friend Dr. Boulter to Ireland, created archbishop of Armagh. Here he enjoyed other emoluments, which enabled him to represent in parliament the county of Armagh. On his return to England in 1748, he found himself the survivor of most of his early friends and enemies. He died in the following year, at the age of 78. His poems were published collectively in one volume, 1748; and they now make a part of the body of English poetry. "The pastorals have more natural description than Pope's melodious imitations; but they are not excellent in this respect: and the air of simple rusticity thrown over them, while it gives no resemblance to real life, disgusts by meanness and puerility. That the author, when he aimed at the elegance of cultivated verse, could attain it, is proved by his two translations from Sappho, and his letter from Copenhagen, which are undoubtedly his best performances: the latter is scarcely surpassed as a descriptive piece." Johnson's Lives of the Poets.

**PHILIPS**, **JOHN**, an English poet, born in 1676 at Brampton, in Oxfordshire, was the son of Dr. Stephen Philips, archdeacon of Salop. He received his classical education at Winchester school, where he gained great reputation by his Greek and Latin exercises. In 1694 he removed to Christ-church college in Oxford, where he fully maintained the classical distinction he had acquired, and obtained the esteem of several literary characters. In 1703 he became known to the public by his poem of "The splendid Shilling;" and the reputation which he acquired by this effusion was the cause of his being selected by Harley and St. John, the heads of the Tory party, to celebrate the victory of Blenheim, in competition with Addison, the poet of the Whigs. His poem on this occasion did not add to his fame. His didactic poem on Cyder, in 1706, is his principal piece, and to this his name is chiefly associated. It at once became popular, and raised him to eminence among the poets of his time. He had meditated a poem on the "Last Day," which he did not live to finish. He died in February 1708, in the 32d year of his age, to the regret of his friends, to whom he was endeared by his blameless and benevolent character. A tablet was erected to his memory in the Hereford cathedral, where he was buried; and a monument was placed in Westminster abbey by lord chancellor Harcourt, with a long and classical epitaph, composed by bishop Atterbury. The "Splendid Shilling" and the "Cyder" of this poet are read with pleasure. "In both, the Miltonic verse and diction are imitated: the *first*, for comic effect, by contrasting the solemnity of the style with the levity of the subject; the *second*, for the purpose of elevating a topic taken from common life. Dignity and variety are likewise attempted to be given to the didactic poem, by a close imitation of the plan and manner of Virgil's Georgics, particularly in frequent digressions, from which the writer usually returns with much skill to his proper subject. On the whole, the piece is rather to be admired for its art and learning than its poetry: it has little either of grandeur or beauty.

beauty, and Milton is copied rather in his faults than his excellencies."

**PHILIPSBURG**, in *Geography*, a town of America, in New Jersey, and county of Suffex, on the E. bank of the Delaware, opposite to Eaton in Pennsylvania; 41 miles N.W. of Trenton.

**PHILIPSBURG**, or *Philipsdown*, a township of Dutchess county, New York, on the E. side of Hudson river, 19 miles above New York, containing 2754 inhabitants. This township has within it a silver mine, which yields virgin silver.

**PHILIPSBURG**, a town and fortress of the duchy of Baden, in the bishopric of Spire, near the Rhine; formerly called "Udenheim." Here Protestants and Catholics enjoy a free exercise of their religion; five miles S.S.E. of Spire.

**PHILIPSTADT**, a town of Sweden, in the province of Warmeland, surrounded by lakes and mountains. It was built by, and held its charter of privileges from Charles IX., who called it after the name of his son, Charles Philip. In 1775 it was consumed by fire, and afterwards rebuilt; 30 miles N.E. of Carlstadt. N. lat. 59° 40'. E. long. 13° 27'.

**PHILIPSTOWN**, a post-town of Ireland, and the shire-town of the King's county, in the province of Leinster. It is a very small place, and has lost its former privilege of being represented in parliament, in consequence of the Union. It obtained its name from king Philip, husband of Mary, queen of England, who made this part of the county shire-ground in 1557. It is 38½ miles S.W. from Dublin.

**PHILISTINES**, in *Ancient Geography and History*, the name of a people of Palestine, who were descendants partly of the Casluhim and partly of the Caphtorim, who sprang from Mizraim, the son of Ham, who was the son of Noah. Their ancestors came originally from Egypt, and settled in Palestine, to which they gave their name. Their most ancient form of government was monarchical, and their first kings were denominated Abimelech; for such were the kings who were concerned in the transactions with Abraham and Isaac, which are recorded in the book of Genesis. But these first kings were under great limitations. The kings of the second race were distinguished by the appellation of Achish, though they also bore the name of Abimelech. During their best times, they resided at Gath; from this place the royal seat was removed to Ascalon; and from that city to Gaza. The Philistines appear to have had strong notions of liberty. They did not practise circumcision; and in their earliest times, they held adultery in the greatest abomination. They were a very warlike people; and they also distinguished themselves by their industry; but their character was very different at different periods. In the days of Abraham and Isaac, they were a righteous and hospitable nation; but a revolution afterwards took place in their government, religion and morals, so that they resembled other idolatrous nations, and practised similar enormities. They became in process of time exceedingly ambitious and arrogant, and their enmity to the Israelites was inveterate and irreconcilable. For their deities they entertained the most profound veneration, and they reposed in them an unbounded confidence. They were much addicted to trade. Their language differed little from that spoken by the Hebrews, so that these different people were able to converse together without much difficulty; and, without doubt, they had the arts and sciences in common with their ingenious and learned contemporaries, and perhaps some of them in greater perfection; for the invention of the bow and arrow is ascribed to these people. Their religion varied at different periods. Under their first race of kings, they used

the same rites with the Hebrews. In succeeding times they became superstitious and idolatrous; and each of the principal or five cities had an idol of its own. Marna, or Marnac, was worshipped at Gaza; Dagon was the object of worship at Azotus; Bualzebul, or Beelzebul, was the god of Ekron; Derceto was the goddess of Ascalon; and Ashtaroth, or Astarte, was worshipped at Gath. For the celebration of their religious rites and festivals they erected large and spacious temples; and they presented their gods with the chief part of their spoil, carrying them about with them when they went to war.

This extraordinary nation came directly out of Egypt, and finding the Avims or Avites (Deut. ii. 23.) seated in a pleasant and fruitful land, and themselves strong enough to expel them, they made the attempt and succeeded. Besides the intercourse of their kings with Abraham and Isaac, to which we have already referred, we find no particular mention of them for a long series of years. Their ancient form of government was dissolved, the Israelites were the objects of their aversion, and they are represented under distinct jurisdictions, and at strife with the children of Israel. With Joshua they do not seem to have had any war, but after his death, they were deprived by the tribes of Simeon and Judah of three of their cities, *viz.* Gaza, Ascalon, and Ekron; of which, however, they afterwards obtained possession, either by grant or by conquest. About 120 years after the reduction of these three cities (B.C. 1305), the Philistines held the Israelites in subjection, till they were delivered by Shangar, and they also suffered in common with the Israelites by the incursions of Zebah and Zalmunna, kings of Midian. In the days of Jephthah, they united with the Ammonites in oppressing the Israelites. They again reduced the Israelites, and kept them in subjection for forty years (B.C. 1137), and in the following year they took Samson prisoner, who refused himself and killed 1000 of his adversaries. But their history is recorded in scripture, and it is needless for us to pursue it in a minute detail of the various events which it comprehends. Until the reign of David they maintained their independence; but he reduced them to a state of subjection, and made them tributaries to his throne. It may be also concluded, that having so often, and to so little purpose, engaged in bloody and destructive wars, they grew wiser, and rather applied themselves to commerce, and the arts of peace. Notwithstanding their vigorous opposition to successive kings of Israel, they afterwards courted the favour of Jehoshaphat, king of Judah, by a voluntary payment of the tribute, which had been imposed upon them by their conqueror David; and which, it seems, they had neglected to pay to some of Jehoshaphat's predecessors. In the year 888 B.C. they rebelled against Jehoram, the son of Jehoshaphat, invaded his kingdom, and rifled his palace, and carried their rage against him to such a height, as to exterminate all his family, except Athaliah, and her son Ahaziah, who had the good fortune to escape their fury. At this time they carried off a great number of captives, whom they sold to the Edomites, the worst enemies of the Israelites, next to themselves, and some to the Grecians, thus removing them to such a distance, that they could have little or no chance of visiting their native country again. This success is supposed to have been owing, in a great measure, to the assistance afforded them by the Arabians, who, at the same time, made war upon the Israelites, either separately, or in conjunction with the Philistines. Their success, however, proved unfortunate to them in the issue; for (807 B.C.) they were invaded by Uzziab, king of Judah, who dismantled Gath, Jabnah, and Ashdod, and built strong cities among them, in order to awe, and keep them

them in subjection. In the reign of Ahaz, perceiving the weak state of the kingdom of Judah, they again took up arms, and warred against Ahaz so successfully, as to repair the losses they had sustained in the time of Uzziah, his grandfather; for they reduced the cities of Bethshemes, Ajalon, Gedaroth, Schochoh, Timnah, and Gimzo, with the territories belonging to them, and settled there; thus adding a large portion of the kingdom of Judah to their own country. This happened about the year 740 B.C. (2 Chron. xxviii. 18.) But they did not long retain this acquisition: for (713 B.C.) Hezekiah, the son of Ahaz, whom they had conquered, overran their whole country (2 Kings, xviii. 8.); and, at the same time, they were attacked by the Assyrians, in the reign of Sennacherib, who sent his general Tartan to reduce them. Their city Ashdod was besieged and taken by him (Isaiah, xxi. 1.); and thus they were reduced to the lowest ebb of misfortune. By their subjection to the Assyrians, they not only lost their liberty, but their country became the seat of a long and obstinate war. For Psammetichus, king of Egypt, being jealous of the growing power of the Assyrians, and apprehensive that Egypt might share the fate of its neighbour, undertook to drive them out of Palestine. With this view, he laid siege to Ashdod or Azotus (674 B.C.), which lasted 29 years before he could reduce it. From this time they were tributary to the great monarchies, as they succeeded each other. In the beginning of this slavery, they were miserably harassed by the Egyptians, who, desirous of making their barrier as strong as possible, seized on a great part of their country, and particularly on the city of Gaza. What became of them at last may be best learned from the threats of the prophets, and particularly Zephaniah, who paints their destruction in very lively colours: "Gaza shall be forsaken, and Ashkelon a desolation; they shall drive out Ashdod at the noon day, and Ekron shall be rooted up. Wo unto the inhabitants of the sea-coasts, the nation of the Cherethites! The word of the Lord is against you: O Canaan, the land of the Philistines, I will destroy thee, that there shall be no inhabitant; and the sea-coasts shall be dwellings and cottages for shepherds, and folds for flocks." Zeph. ii. 4-6. Joel, iii. Amos, i. Jerem. xlvii. Ezek. xxv. Zech. ix. 5. Anc. Un. Hist. vol. 1.

PHILISTUS, in *Biography*, an eminent historian of antiquity, was, according to some writers, a native of Nauracris, according to others of Syracuse. He was born about the year 431 B.C., and was sent to Athens for his education, where he studied under Isocrates and the poet Evenus. Fixing his abode at Syracuse, he promoted the schemes of Dionysius the elder, to overthrow the liberties of his country, and was placed by him in the important post of governor of the citadel. That prince connived at the criminal intercourse which Philistus maintained with his mother; but upon the discovery of a secret marriage, which he had contracted with the daughter of Dionysius's brother, the tyrant banished him. Philistus retired to Adria, where he employed his leisure in composing a history of Sicily and of the reign of Dionysius. He remained in banishment till after the accession of Dionysius the younger, when he was recalled upon the persuasion of those courtiers who were jealous of the influence acquired by the virtuous Dion, and his friend the philosopher Plato, who had been invited to the court of Syracuse. Philistus by his arts soon procured the banishment of Dion, and brought himself into high esteem by his tyrannical maxims. When Dion returned with an armed force to rescue his country from tyranny, Philistus was made admiral of the fleet to oppose him. An engagement ensued, in which the royal fleet was defeated, and Phi-

listus was taken prisoner and put to death, in the year 357 B.C. He was a man of learning and abilities, but his memory has been stigmatized for the bad use he made of his talents. He was author of several works, but is chiefly famous for his "Antiquities of Sicily," and his "History of Dionysius the Elder;" and that of part of the reign of Dionysius the younger, in two books. In his style he was the imitator of Thucydides; his histories were long preserved in libraries, but no part of them has reached modern times.

PHILITIA. See PHIDITIA.

PHILIZERS, or PHILAZERS. See FILAZER.

PHILLIS, in *Ancient Geography*, a country of Thrace, in the vicinity of mount Pagaus.

PHILLYRA, a river of the Peloponnesus, in Arcadia.

PHILLYREA, in *Botany*, *Φιλλυρέα* of Dioscorides, supposed to be so called from *Phillyra*, the mother of Chiron. The modern Greeks know this shrub under the name of *Φύλλα*, or *φουλλία*.—Linn. Gen. 10. Schreb. 13. Willd. Sp. Pl. v. 1. 42. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 1. 19. Sm. Fl. Græc. Sibth. v. 1. 2. Prodr. v. 1. 3. Juss. 106. Tourn. t. 367. Lamarck Illust. t. 8. Gærtn. t. 92.—Class and order, *Diandria Monogynia*. Nat. Ord. *Septaria*, Linn. *Jasminea*, Juss. *Oleina*, Brown.

Gen. Ch. Cal. Perianth inferior, of one leaf, tubular, minute, permanent; its mouth four-toothed, erect. Cor. of one petal, funnel-shaped; tube scarcely any; limb in four deep, ovate, acute, recurved segments. Stam. Filaments two, opposite, awl-shaped, short, divaricated; anthers terminal, elliptical, simple. Pist. Germen superior, roundish; style simple, the length of the stamens; stigma thickish, cloven. Peric. Berry globose, of one cell. Seed solitary, globose, large, with a thin brittle skin.

Ess. Ch. Corolla in four nearly ovate segments. Berry superior, globose, single-seeded.

Obs. The thin coat of the seed, so different from the hard nut of a true *Olea*, appears sufficient to keep this genus distinct from that. Mr. Salisbury and Mr. Brown have, nevertheless, united them. See OLEA; where the word Calyx in the essential character is by mistake put for Corolla.

1. *Ph. media*. Olive-leaved Phillyrea. Linn. Sp. Pl. 10. Willd. n. 1. Ait. n. 1. (Phillyrea; Matth. Valgr. v. 1. 155. *Ph. tertia*; Clus. Hist. v. 1. 52. *Ph. latiore folio*; Ger. Em. 1395.)—Leaves elliptic-lanceolate, entire; rarely somewhat serrated.—Native of the south of Europe; very common on rocks, banks, and ruins in Italy, as on the Coliseum, and other ruins, at Rome, flowering from March to May. In our gardens it is a hardy evergreen, flowering in May and June, and was cultivated by the earl of Essex in 1597, according to the first edition of Gerarde. A bushy smooth shrub, with many straight, roundish, pale brown, leafy, wand-like branches. Leaves opposite, on short stalks; of a dull, scarcely shining green above; paler, opaque, and dotted, beneath; with a mid-rib and fine lateral veins; their usual length is about an inch and a half, their form elliptical, with a small point; the margin slightly revolute, for the most part quite entire, but some leaves are minutely and distantly toothed towards the point. There are, besides, several varieties in the shape of the leaves, which are occasionally more oblong or lanceolate, as well as in the length and direction of the branches. Stipulas none. Flowers small, yellowish-white, in little dense, short, bracted, axillary clusters. Fruit globular, dark purple, the size of a small pea, bitter and nauseous.

2. *Ph. angustifolia*. Narrow-leaved Phillyrea. Linn. Sp. Pl. 10. Willd. n. 2. Ait. n. 2. Ger. Em. 1395.

(Ph.

(Ph. quarta et quinta; Cluf. Hist. v. 1. 52.)—Leaves linear-lanceolate, entire; or nearly so.—Native of Italy, Spain, and Portugal. It is sold in the markets at Lisbon to make brooms, and called *Lentisco*, according to a note of Læffling's, in the Linnæan herbarium. This differs from the former merely in its narrower and somewhat longer leaves, which are dotted, and occasionally toothed, precisely as in that species, nor can we consider it as more than a variety, though kept distinct, and even subdivided into several varieties of its own, in the Hortus Kewensis.

3. Ph. *latifolia*. Broad-leaved Phillyrea. Linn. Sp. Pl. 10. Willd. n. 3. Ait. n. 3. Sm. Fl. Græc. Sibth. v. 1. 2. t. 3. (Ph. *secunda*; Cluf. Hist. v. 1. 52. Ger. Em. 1396.)— $\beta$ ; Ph. *prima*; Cluf. Hist. v. 1. 51. Ger. Em. 1600.—Leaves ovate, somewhat heart-shaped, ferrated; rarely entire; sometimes sharply toothed.—Very abundant in the south of Europe, on open hills, and as frequent as most evergreens in our shrubberies. Dr. Sibthorp considers this as the identical *SPALUSIA* of Dioscorides, being very common in Greece and its islands. The leaves are of a dark shining green, dotted beneath, of a broad ovate figure, about an inch long, pretty uniformly ferrated; in the variety  $\beta$  they are very sharply and strongly toothed, and sometimes rather elongated. The Ph. *arbor Galloprovinciæ*; Lob. Ic. v. 2. 132, appears to be an entire-leaved variety of this. Linnæus referred it to *media*, but it agrees with the common *latifolia* in the darker hue of the leaves, as well as their short broad figure. We have no doubt of *latifolia* and all its varieties being distinct from the other two; the only question is whether they are distinct from each other.

PHILLYREA, in Gardening, contains plants of the hardy, evergreen, shrubby kind, of which the species cultivated are; the lance-leaved phillyrea (P. *media*); the narrow-leaved phillyrea (P. *angustifolia*); and the broad-leaved phillyrea (P. *latifolia*).

Of the first sort there are several varieties, namely, the privet-leaved and olive-leaved; which are of humbler growth, seldom more than eight or ten feet high; the branches of the first are weaker, spread wider, and are covered with a light brown bark: the leaves are stiff, almost two inches long, and half an inch broad in the middle, drawing to a point at both ends, and sit close to the branches; the flowers are in little axillary clusters, small and whiter. In the latter the branches are stronger, and spread out wider; the bark is of a lighter colour; the leaves are stiff, smooth, and entire, on very short footstalks, of a lucid green, and terminating in a point; the flowers in clusters, on pretty long peduncles, from the axils of the young branches, small and white. And in the Kew catalogue there are three other varieties mentioned: namely, the long-branched, which has long upright branches; the drooping, which has the branches hanging down and straddling; and the box-leaved.

In the second sort there is a variety termed rosemary-leaved, which is of humbler growth, seldom rising more than four or five feet high, sending out slender, opposite, straight branches, sparsely disposed; the leaves dark-green, stiff, and entire; about an inch long, and not more than an eighth of an inch broad; sessile; the flowers are small, white, in clusters from the side of the branches; the berries very small, rarely ripening in this climate. And in the Kew catalogue another variety is mentioned, under the name of dwarf phillyrea.

The third sort has also a variety, the prickly broad-leaved, which is as high as the smooth one, sends out several strong branches, which grow erect, and are covered with a grey bark; the leaves are an inch and half long, and an inch broad, firm, of a lucid green, and ferrate, each ferrature

ending in a spine. And the Kew catalogue has another, under the name of the ilex-leaved.

*Method of Culture.*—These plants are capable of being increased either from seeds or layers, but the latter being the most expeditious method is chiefly preferred in this climate.

And the best season for laying them down is in autumn, when the ground should be dug round the stems of the plants intended to be laid, rendering it very loose; then making choice of a smooth part of the shoot, a slit should be made in it upwards, in the manner practised in laying carnations, bending the branch gently down to the ground, making a hollow place to receive it; and having placed the part which was slit into the ground, so as that the slit may be open, it should be fastened down with a forked stick that it may remain steady, covering that part of the branch with earth about three inches thick, keeping the upper part erect. The layers must be kept clean from weeds in the spring and summer following, as, if suffered to grow up amongst them, they will prevent their taking root. In the autumn following, most of the plants thus laid will be rooted, at which time they may be taken off, and carefully planted in a nursery, where they may be trained three or four years in the manner they are intended to grow; during which time the ground should be dug between the rows, and be cut about the roots of the plants every year, to cause them to strike out strong fibres, so as to support a good ball of earth when they are removed. Their stems should likewise be well supported with stakes, in order to make them straight, otherwise they are very apt to grow crooked and unsightly. When they have been thus managed three or four years, they may be removed into the places where they are designed to remain. The best time for this is the end of September, or beginning of October; but in the removing them their roots should be dug round; and all downright or strong roots, which have shot out to a great distance, be cut off, that they may have balls of earth preserved to their roots, otherwise they are liable to miscarry; and when placed in their new situations, some mulch should be laid upon the surface of the ground to prevent its drying.

The plants should likewise be supported with stakes until they have taken fast hold of the earth, to prevent their being turned out of the ground, or displaced by the winds, which destroy the fibres that are newly put out; and greatly injure the plants.

They delight in a middling soil, which is neither too wet and stiff nor too dry, though the latter is to be preferred to the former, provided it be fresh. The sorts with small leaves are commonly two years before they take root when laid: therefore they should not be disturbed, as the raising them out of the ground greatly retards their rooting.

In the seed method, the seeds should be sown in the autumn soon after they are ripe, as when they are kept out of the ground till spring they do not grow the first year. They succeed best when sown in pots or boxes filled with light loamy earth, and placed under a garden frame where they may be screened from hard frosts, but always exposed to the open air in mild weather. If the seeds are sown early in the autumn, the plants appear in the spring; but if they should not come up, the pots should be plunged into the ground in an east border, where they may only have the morning sun, in which situation they should remain the following summer; during which time they may be constantly kept clean from weeds, and in the autumn removed again under a frame for shelter in winter, and the spring following the plants will certainly come up, if the seeds were good. Towards the middle of April, the pots should be again plunged into the ground

ground on an east border, to prevent the air from drying the earth through the pots, which is generally the case when the pots stand upon the ground; so that they must then be frequently watered, which should not be practised to these plants where it can be avoided. In the autumn following the plants should be carefully taken out of the pots and planted out in a nursery-bed, covering the surface with old tan to keep out the frost; and if the winter prove severe, they should be covered with mats: afterwards they may be treated as those from layers.

These shrubs are so hardy as to thrive in the open air in this climate, and are never injured except the winters are very severe, which sometimes cause their leaves to fall, and kill a few of the weaker branches, but these are repaired by new shoots the following summer; so that there are few evergreen trees which are harder, or that more deserve to be cultivated for the purposes of ornament.

The first and third sorts and varieties are very proper to intermix with other evergreens of the same growth, to form clumps in pleasure grounds and parks, or to plant round the borders of woods which are filled with deciduous trees, where in the summer time their dark shades make a fine contrast with the brighter green leaves of the deciduous trees; and in the winter, when the latter are destitute of leaves, they have a fine effect. These may be trained up to stems, so as to be out of the reach of cattle, and be planted in open places, where, if they are fenced against cattle till they are grown up, they may be afterwards exposed. The others, which are of humble growth, should be confined to gardens or other inclosures, where they may be secured from cattle, &c. They should only have the irregular branches pruned in, occasionally as they want it.

PHILO, a term originally Greek, formed of φίλος, *amicus*, *friend*, or *lover*; now used in composition in several words in our language.

PHILO, in *Biography*, surnamed *Biblius*, from Biblos, the place of his nativity, was a grammarian who flourished from the reign of Nero to that of Adrian. He wrote various books in the Greek language, such as "De Paradis et Deligendis Libris;" "De Urbibus;" "De claris Viris;" and "De Imperio Adriani;" but he is chiefly known as the translator of Sanchoniatho's Phœnician history into Greek, of which a few fragments only remain, that have exercised the critical talents of several learned men. Moreri.

PHILO of *Byzantium*, an architect, who flourished about 300 years before the Christian era, wrote a treatise of machines used in war, which is printed with "Mathematici veteres," in 1693. There is also a piece attributed to him, entitled "De septem Orbis Spectaculis," printed at Rome in 1640.

PHILO, a learned Jewish writer, who flourished in the first century, and under the reign of Caligula, was of the sacerdotal race, and brother to the chief magistrate of his nation at Alexandria, where he was born. He received his education at his native place, and distinguished himself by his early proficiency in eloquence, philosophy, and scriptural knowledge. He is spoken of by Eusebius as a man copious in speech, rich in sentiments, and eminent and sublime in his acquaintance with the holy scriptures. He was particularly versed in the Platonic philosophy. It has been suggested that by attending to the nature of Jewish learning, and comparing it with the spirit of the Alexandrian, it will be perceived in what manner Philo studied philosophy. From the time of the Ptolemies, the use of allegories had been borrowed by the Jews from their Egyptian neighbours, and by the help of these, Platonic and Pythagorean learning was introduced among them, as the concealed and symbolical

sense of their own law. In this manner they were enabled to make what use they pleased of their systems, without appearing to be indebted to heathen philosophers. These systems likewise were adulterated with many dogmas from the oriental philosophy, particularly on the subject of the divine nature. This philosophy, which had been well received in Alexandria, Philo embraced, and he appears to have boldly interwoven the Platonic learning and opinions with the doctrines of the sacred oracles, and ascribed them to Moses. It is also probable that he was, in part, influenced by the example of the Essenes and Therapeutæ, whose method of philosophizing he imitated, though he did not adopt their manner of living: for he always speaks of them in the highest terms of commendation. Philo was not so completely immersed in philosophical studies as to neglect the cultivation of eloquence, and to withdraw his attention from civil affairs. On the contrary, he seems to have acquired a high reputation as an orator, and as a man of wisdom and prudence in the conduct of important negotiations: hence we find him placed at the head of a deputation sent by his countrymen to Rome in the year 42, with the design of vindicating them from the calumnies with which they were loaded by the Alexandrians, and of defending their cause against Appian. It was on this occasion he speaks of himself as old and grey headed, and, therefore, his biographers have imagined he might be at that period about 60 years of age, or that he was born nearly twenty years before the commencement of the Christian era. Though his mission proved fruitless, he committed the substance of his apology for the Jews to writing, and in it gave a favourable specimen of his learning, talents, and integrity. By Eusebius, Jerome, and others, it is said he came a second time to Rome in the reign of Claudius, when he formed an acquaintance with St. Peter, and cultivated his friendship: and Photius affirms that he became a convert to the Christian faith, and was baptized; but that afterwards, having met with some cause of offence, from motives of repentment he renounced his creed. A very ingenious writer, the Rev. J. Jones, has, however, attempted to prove that Philo was the historian and apologist of Christ; of his followers, and of the gospel. In a work entitled "Ecclesiastical Researches," published in 1812, he has entered very much at large into the enquiry, and in a subsequent volume, or "Sequel to the Ecclesiastical Researches," he has given "A summary or concise view of the arguments proving Philo and Josephus to be Christian writers." To these works we refer the reader, it being inconsistent with the limits of our article to enter into the argument. In Dr. Enfield's abridgment of Brucker's History of Philosophy, we have an account of the opinions held by Philo, and of his manner of blending the doctrines of Plato and Moses: and in Fabricius and Cave the subjects of his various treatises, which have reached modern times, have been particularized. The first collection of them was published by Turnebus, in the oriental Greek, at Paris, in 1552, of which, in 1561, there was given a Latin version. They were afterwards published in Greek and Latin at Geneva in 1613, and at Paris in 1640: but the latest and most complete edition is that of London, in 1742, by Dr. Mangey, in two vols. folio.

PHILOCALIA, in *Ancient Geography*, a fortified place of Cappadocia, on the coast of the Euxine sea, with a river of the same name. Pliny.

PHILOCANDRUS, one of the islands of the Ægean sea, called the Sporades, according to Pliny and Steph. Byz. Ptolemy places it among the Cyclades.

PHILOCRENE, a small town of Asia, in Bithynia.

PHILO-

## PHILODEMI DE MUSICA.

PHILODEMI DE MUSICA, is the title of a work in Greek, recovered from the cinders of Herculaneum. The subject is music. At first it was reported to be a treatise on the art; then a panegyric; and lastly a satire, which it turns out to be, of the most bitter kind.

The labour of unfolding the Papyrian rolls was begun more than 50 years ago. The subterraneous city of Herculaneum was discovered in 1742; and we find, from a letter of La Condamine, and another from Camillo Paderni, printed in the Philosophical Transactions of our Royal Society, vol. xlix., that the work of unfolding this MS. was begun in 1749.

It was some time before the name of the author was discovered, and still longer before it could be ascertained of what country or sect he was, or at what period he existed.

The name of Philodemus was, however, well known in Greece. Among others who bore that title, was a very ancient follower of Pythagoras, who was a native of Locris, in Magna Græcia; and two others more recent, one born in Greece, and the other in Asia Minor.

These must not be confounded with the author of a work on the subject of music, which was rescued from the lava of Vesuvius, by being preserved in the ruins of Herculaneum. Philodemus, the author of this work, was a philosopher of the sect of Epicurus, and a poet of considerable eminence. He is praised by Cicero; and Horace refers to one of his epigrams; nor has he been overlooked by Diogenes Laertius, or Strabo, who informs us, that he was a native of Gadera in Syria. He resided at Rome, and was the acquaintance of Tully, and the tutor of Lucius Piso, the consul.

Cicero describes him as a person of liberal manners, and a cultivated mind. His morals, however, were loose; as appears by several of his poetical effusions, which still remain. Of his works, indeed, previous to the discovery of the literary treasures in Herculaneum, only thirty-one of his epigrams were known to exist. The editors of these treatises have added two more to the number, and with a learned research concerning Philodemus himself, have presented his work to the literary world; and it is, undoubtedly, the most curious publication, on the whole, which has appeared since the revival of letters.

The work has been published more than ten years; but about the time of its issuing from the press, the arrival of the French at Naples prevented its circulation. And though printed in 1793, no copies had reached England till 1801; when the late reverend and learned Mr. Cratcherode procured possession of two copies, one of which he sent immediately to Oxford, and dying himself soon after, the other had been seen but by a few. In 1802 we obtained a copy; and as the work had never, to our knowledge, been reviewed, or otherwise noticed in our country; and being written on a subject which the new Cyclopædia embraces in all its branches, a production so curious seemed to demand particular notice among musical articles; for which purpose it has been reserved for several years in possession of the editor to be introduced in its proper place.

The work, published in folio, in a most accurate and splendid manner, is dedicated to the king of Naples by the Herculaneum academicians.

Great praise is due to the editors for the sagacity and erudition manifested in filling up the chasms in the Latin translation, and supplying the defective parts of the original, which have been injured by the fire or by unrolling.

Whoever is well read in the Greek writers on music that are come down to us, and in the different doctrines of the musical sects of antiquity, must perceive that the editors were well qualified for the arduous undertaking.

And though we are now no nearer knowing what the Greek music really was than heretofore, the curiosity of the learned must be considerably gratified by a fac-simile exhibition of the manners in which the ancient Greek volumes were written.

This work of Philodemus was published in confutation of another work on music, the author of which was dead before Philodemus was born. The author of it appears to have been Diogenes, not the Cynic, but the Stoic philosopher of Babylon, so styled because he was born at Seleucia, a town near Babylon. He was a disciple of Chrysisippus. The Athenians sent him on an embassy to Rome with Carneades and Critolaus, 155 years before Christ. Diogenes died at 88, after having recommended wisdom during his whole life, as much by his conduct as discourses. One day, while he was delivering a lecture against cholera, exclaiming with great force against that passion, a young man spit in his face to try his patience. "I am not angry (says Diogenes) but I am in doubt whether I ought not to chastise such brutal insolence."

The work on music which Philodemus has attacked so furiously, was probably his *περὶ ᾠῆς*, mentioned by Laertius.

Perhaps Diogenes, as is usual with panegyricists, asked too much admiration of his favourite art, and Philodemus, like a true determined adversary, grants too little.

There were perpetual disputes about music in Greece, not only among professors, but philosophers. The editors of this ancient tract have defended music well against this pagan *Αμείσοι*, who not only denies its miraculous powers, but its utility on any occasion. However, Pythagoras, Plato, Aristotle, and Plutarch, among the ancients, and many wise and virtuous men among the moderns, such as Bacon, Milton, Dr. Wallis, Arbuthnot, Montesquieu, &c. have thought differently from the musical atheist, Philodemus, and allowed that, of all the arts, "music is the only one that cannot corrupt the mind." For the rest, we are much of the same opinion with Philodemus, as to a love for music being the attribute of a good heart; particularly when we reflect on the passions which Ptolemy Auletes, Nero, and our Henry VIII. had for the art; we are then very ready to relinquish the opinion of Shakspeare and other poets on the subject.

The round assertions by Philodemus against music, are the following.

### CHAP. I.

1. It does not produce such effects in the mind, as can give rise to nobler manners, or excite diligence.
2. In this all hearers are alike; their sense of hearing is the same; but the difference in the effects of music arise from some previous operations, some preconceived opinions. The distinctions of the enharmonic and chromatic genera are owing to these opinions, and the operations to which they give rise; those who understand nature and her works, will derive satisfaction from the pleasurable parts of music of every kind. Music is undoubtedly multifarious; but still it cannot infuse the forms of manners, which approach to virtue.
3. Music demands a previous degree of knowledge. A mere simple modulation cannot rouse the inactive mind, nor can it induce any disposition to morals, which was not implanted by nature; neither can it calm the agitated mind, or guide it from one propensity to another. Nor is music an imitative art, more than cookery. To the perception of the ear, enharmonic and chromatic are the same, and their mixtures are the same, their differences being only known to professors.

# PHILODEMI DE MUSICA.

## CHAP. II.

*Whether music, per se, is proper for divine worship?*

4. The gods do not demand the honour which we bestow : nature impels our mind to bestow it on them : hence the different ceremonies in different countries arose. Music, however, was never ordered by them : it is not music which is serviceable in worship, but rather public prayers : it is not known by tradition, that music was much employed by the ancients, and never, but by particular Greeks on particular occasions. In modern times it has become a trade, and is admitted as an essential part of religious ceremonies, and at the games, which was not the case in old times.

5. Even if we allow that the gods instituted spectacles and shows in honour of themselves ; yet it does not follow that they ordained the addition of music.

## CHAP. III.

*Whether music contributes to render more effective encomiastic and hymeneal poems, epithalamia, and threnodes.*

6. Music gives no additional power to encomiastic poems : and at marriages is introduced merely as cooks add sauce, without increasing the real and genuine good of nuptials. The effect on these occasions is produced by the poems, not by the music ; the passion of love is not assisted by the union of the two ; nor can they really procure any alleviation to affliction when epicedia are performed.

## CHAP. IV.

*On music at the games.*

The music of the games is not universally commended ; nor does it produce any universal benefit. The opinion of low and ignorant people I do not regard.

7. In the games the skill and art may please ; but we should not miss it if the dance were removed from the drama ; as it tends not to honesty nor honour ; and as to the female dancers, no greater incitement to intemperance and licentiousness can be imagined.

## CHAP. V.

*Whether music has in its nature any power of moving?*

8. Whether the influence which the solemn music has at the Dionysiaca be, like the games, of divine original ? The subject needs not discussion.

9. It is said, that as fire has in it a burning quality, so music has in it something that excites to action. Hence, observes the absurd denier, the rowers in vessels, and the reapers and the vine-dressers, worked to the sound of music. While the song is singing, however, the workmen rest. Should, then, according to the fable of Orpheus, should a musician stand by, and play, when a house is building ?

10. He (that is Diogenes, the author of the treatise which Philodemus answers) asserts also, that not merely the mind, but even the body, is influenced by music ; and that artificers are rendered more skilful by it ; and that music had greater power over the mind than argumentative sentiments.—In modern times music is much neglected : poetry is still cherished and brought forward.

11. Music was never reckoned universally necessary as a study or pursuit ; nor was Themistocles acquainted with it.

12. Music after entertainments, when the voice and the mind are disordered by wine, cannot stir up the hearers to enter into regular conversation. Nor is it of real utility in the education of children ; as it is disputed what virtue takes its form in the mind according to the species of music.

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## CHAP. VII.

*Whether music contributes to love?*

13. Music contributes nothing to the passion of love.

## CHAP. VIII.

*What does music add to feasts?*

14. The words of songs, and not the music, may animate and purify the minds of guests.

## CHAP. IX.

*Whether music has any tendency to conciliate friendship?*

[The answer to this question could not be recovered.]

## CHAP. X.

*What is to be thought of the childish stories of Thales and Terpander?*

18. The invitation of Thales to the Lacedæmonians, in order to settle a dispute, as ordered by the Pythian oracle, examined.

19. The calm produced was not by music, but by his admonitions, which might be sung.

## CHAP. XI.

*Whether music ought to be recommended as contributing to religion.*

20. What has been written about music, as contributing to divine worship, may be applied to various arts : the cook, the chaplet-weaver, the perfumer, the baker, the farmer, the painter, the architect, and statuary, may be supposed to serve the same cause with equal propriety.

21. The music adds little to the power of poetry, in celebrating the honour of the gods. Diogenes persuaded himself, that the gods are delighted, some with one song, and some with another, and that there are peculiar songs suitable to each of the divinities.

## CHAP. XII.

*Whether music sharpens the intellects, and has any relation to other sciences?*

22, 23. It is asserted, that music does not sharpen the mental faculties ; and that it has only a slight relation to grammar. The assertion of ——— and his followers, about the connection of music with philosophy, is declared false.

## CHAP. XIII.

*Whether music disposes the mind to virtue?*

24, 25. When Diogenes asserts that music approaches nearly to true philosophy, is most serviceable in all the duties of life, and adds to every virtue ; he trifles ; as I have shewn in the third book of my Hypomnemata, or Commentaria. It is ridiculous to suppose, that any inarticulate sounds can dispose the mind to a speculative disposition, with respect to useful subjects.—If Plato had said that music was of advantage to justice, he would probably have assigned reasons for the assertion ; but he only observes that justice bears an analogy to music ; and asserts not that a musician is a just man, nor that a just man is a musician.

26. No man ever studied music in order to facilitate his road to the acquisition of virtues. When the poet and musician unite in the same person, the hearer's mind derives advantage from the sentiments, not from the rhythm of the verses, or the music to which they are sung.

## CHAP. XIV.

*What is to be understood by the name of music?*

It has been said that we have uncultivated minds, when

we suppose that philosophers and thinking musicians imagine, that songs and rhythm, without significant words, impel to virtue, while mankind believe that language, aided by melody and rhythm, produce this effect. So Plato asserts: we contend not therefore with the ignorant, but with philosophers; moreover, we are surprised at the name of *musician* being given to an instrumental performer; and we are not willing to rank Pindar, Simonides, and all the lyric poets in the number of musicians.

[In this chapter Philodemus seems to write against some of his contemporaries, as well as Diogenes, Pindar and Simonides, who were musicians as far as they exhilarated the hearts of men; and poets, as far as their verses instructed mankind. This is an important chapter, but in a miserable state.]

## CHAP. XV.

*Whether music corresponds with the celestial bodies?*

[This chapter is so mutilated, that little of it can be understood. Philodemus, however, appears to ridicule the notion of Pythagoras, concerning the music of the spheres, which was heard only by the gods, and inaudible to mortal ears.]

## CHAP. XVI.

*Whether music can change the affections of the mind?*

31. [Philodemus contradicts what appears to have been advanced by Diogenes, concerning the power of music to lead the heart from vice to virtue. He seems to say, that this can be effected only by arguments; and that if such effects are produced on the stage, it is by the words, not the music; for harangues, without music, have achieved this; and if mere sounds could effect this change by the ears, that which pleased the smell or taste, might do the same by means of the nose, and the palate.]

## CHAP. XVII.

*Whether music is of any real utility?*

They are deceived who have asserted, that the art is of real utility to mankind in general. Those arts which benefit life, such as agriculture, weaving, architecture, are truly useful; which cannot be said of what merely delights. It does not appear that music corrects the failings of her own sons; nor would Damon have made such an assertion before the true court of the Areopagites, as he did before a fictitious one. The power of giving pleasure must not be confounded with utility; or else philosophy would perchance be regarded as inferior to music and many other arts.

## CHAP. XVIII.

*Whether the gods invented music?*

The gods did not invent music, but man, by his reasoning powers, taught himself singing. The powers of reasoning may invent and teach what is bad, as well as what is good. At any rate, music did not proceed from the gods more than any other art, nor does their worship demand its aid. Its exhibitions are not to be preferred in instructing mankind.

## CHAP. XIX.

*For what purpose is music usually taught?*

The professors of music have exalted this art, in order to augment their own consequence, though they are generally of low birth and poor.

[This last chapter is terribly mutilated, and difficult, if not impossible, to be understood.]

Riches and fame are derived from other professions; and

public affairs are rather objects of study and attention than music.

[Philodemus seems to have written this treatise, in order to counteract any ill effects which might arise from the enthusiastic exaggerations of the virtues and powers of music, in the essay published by the Stoic Diogenes.]

PHILODOTUS, in *Zoology*. See MANIS.

PHILÔE, or PHILÉ, in *Geography*, an enchanting island of Egypt, on the Nile, in the vicinity of Assouan or Syene, of which, and also of its monuments, and of the cataracts in its neighbourhood, we have beautiful drawings in the second volume of Denon's Travels. This island is about half a league round, and was formerly inhabited in common by the Ethiopians and Egyptians. When Denon visited it, there were no inhabitants on the shore; on the approach of the French they had quitted it, and had retired to a second and larger island. At the island of Philôe, the Nile makes a bend, as if, says Denon, to come and visit this enchanting island, where the monuments are only separated by tufts of palm trees or rocks, that appear to be left merely to contrast the forms of nature with the magnificence of art, and to collect in one rich spot every thing that is most beautiful and impressive. As the Nile ceases here to be navigable on account of the cataracts, all the merchandise of the Ethiopian trade, which is landed at Philôe, must be transported by land to Syene, to be there re-embarked. Beyond Philôe the river is quite open and navigable. After Philôe had been attacked by the French, the whole population carried off, and the island left a perfect desert, Denon returned, and struck with the sumptuous appearance of its edifices, he concluded that it was to produce a similar effect upon strangers entering their territory, that the Egyptians had collected upon their frontier such a splendid collection of monuments. Philôe was the entrepôt of a commerce of barter between Ethiopia and Egypt; and wishing to give the Ethiopians a high idea of their resources and magnificence, the Egyptians had raised so many sumptuous edifices on the confines and natural frontier of their empire, Syene and the cataracts. The ruins in this island consist of a small sanctuary, formed by a portico of four columns, with very elegant capitals, to which had been added at a later period another portico, which was without doubt attached to the circumvallation of the temple. The most ancient part was more ornamented than the rest; the use made of it in the rites of the Catholic religion has impaired the original character, by adding square arched door-ways. In the sanctuary, close to the figures of Isis and Osiris, may still be seen the miraculous impression, as Denon calls it, of the feet of St. Anthony, or St. Paul the hermit. Within the space of 600 yards, there are seven or eight monuments, which, upon examination, appeared to have been constructed at different periods, by several nations, and to have belonged to different forms of religious worship. The union of these various edifices, each of them in itself regular, and crowded together in this narrow spot, formed an irregular group of most picturesque and magnificent objects. Denon could here distinguish eight sanctuaries or separate temples, of different dimensions, and built at different times; the limits of each had been respected in the construction of the succeeding ones, and thus the regularity of the whole had been impaired.

Besides the vast enclosure, particularly described by Denon, in which numerous temples were connected and grouped together by dwellings for the priests, there were two temples standing apart; the smaller of which was singularly beautiful, in perfect preservation, and so small, that

it almost excited the desire of carrying it away. Within it were some remains of a domestic scene, which seemed to be that of Joseph and Mary, and suggested the subject of the flight into Egypt, in a style of the utmost truth and interest. Besides the Egyptian monuments, Greek and Roman ruins are found at the S.E. end of the island, which seemed to be the remains of a small port, and a custom-house; of which the wall of the façade is decorated with pilasters and arcades of the Doric order; some standing fragments of columns shew an open gallery, or a kind of portico in front; between these ruins and the Egyptian monuments, the sur-basis of a Catholic church may be remarked, which is built of antique fragments, mixed with crosses and Greek ornaments of the later ages; for in these countries Catholicism has been too poor to remove entirely her own worship from the pomp of idolatrous temples. After having established her faints in the face of the Egyptian deities, she has often painted a St. John, or St. Paul, by the side of the goddess Isis, and disguised Osiris into St. Athanasius; or dilapidating the Heathen temples, she has used the ready made materials in constructing her own edifices of religious worship.

**PHILOLAUS**, formed of *φιλος*, and *λαος*, *people*, in *Mythology*, a denomination under which Esculapius was honoured in a temple at Afopus, in Laconia.

**PHILOLAUS**, in *Biography*, a Pythagorean philosopher, who flourished about 375 years B.C. was a native of Crotona. He was a disciple of Archytas, and a contemporary with Plato. He was the person by whose means it is supposed the Pythagorean doctrine was first divulged, for it was from him that Plato purchased the written records of that system. Philolaus fell a sacrifice to political jealousy, for aiming, or for being suspected of aiming, at the possession of despotic power in the government of his country. Philolaus referred every thing that exists to mathematical principles. He taught that reason, improved by mathematical learning, is alone capable of judging concerning the nature of things; that the whole world consists of infinite and finite; that number subsists by itself, and is the chain which by its power sustains the eternal frame of things; that the monad is not the sole principle of all things, but that the binary is necessary to furnish materials from which all subsequent numbers may be produced; that the world is one whole, which has a fiery centre, about which the celestial spheres revolve; that all things are preserved in harmony by the law of necessity, and that the world is liable to destruction both by fire and water; hence, and from other tenets, held by this philosopher, he is supposed to have believed in two independent principles in nature, God and matter, and that it was from this same source that Plato derived his doctrine upon the subject. It has been said, but without sufficient authority, that to Philolaus should be ascribed the invention of that true system of the world, which Copernicus afterwards revived. Enfield's Hist. Phil.

Philolaus taught the division of the tone in music, by which the diesis or leimma resulted on one side, and on the other the apotome of near a quarter of a tone; the apotome is the residue of a tone major, after the scission of the leimma.

He called the number 8 *geometric harmony*, as comprehending all the ratios of simple concords; for the 6th minor being five to eight, has only 8 for its greatest term, or rather as it contains the greatest system of three octaves, the ancients did not enumerate the minor.

**PHILOLOGY**, *φιλολογία*, formed from *φιλος*, and *λογος*, *lover of discourse*; a science, or rather assemblage of several sciences, consisting of grammar, rhetoric, poetry, antiquities, history, and criticism; which see respectively.

Philology is a kind of universal literature, conversant about all the sciences, &c. their rise, progress, authors who have cultivated them, &c.

Philology makes what the French call the *belles lettres*, which see. In the universities it is also called *humanities*, or *humaniores literæ*.

Anciently, philology was only a part of grammar.

Eratosthenes, library-keeper at Alexandria, was the first who bore the splendid title of Philologus, according to Suetonius; or that of *critic*, according to Clemens Alexandrinus. He lived under Ptolemy Philadelphus, and died in the 146th Olympiad.

**PHILOMATHES**, *φιλομαθης*, formed from *φιλος*, *lover*, and *μαθωναι*, *I learn*, a lover of learning or science.

**PHILOMELA**, in *Ornithology*. See *CERTHIA flaveola*.

**PHILOMELIUM**, in *Ancient Geography*, a town of Asia, in the Greater Phrygia. Ptolemy and Strabo.

**PHILONIUM**, in *Pharmacy*, an opiate, or electuary, of which there are two kinds, the Roman, and the Persian.

The Roman, called also the great philonium, took its name from the physician Philo, who invented it. It consists of the seeds of henbane, pepper, opium, and other ingredients. It is used to promote sleep, and against colds, colics, &c.

The Persian philonium consists of several ingredients, among which are opium, terra sigillata, lapis hæmatites, castor, and saffron. It is used to stop hæmorrhages, dysenteries, &c.

**PHILONIUM Londinense**, the name by which the medicine commonly called *philonium Romanum* has been formerly called in the London Dispensatory. The composition is also much altered, as well as the name, and was ordered to be made thus: take white pepper, ginger, caraway-seeds, of each two ounces, opium six drams, syrup of diacodium boiled to the consistence of honey, three times the weight of all the rest. The opium is to be dissolved in a little wine, and then mixed with the syrup; after which the powders are to be stirred in, and the whole made into an electuary.

**PHILOPATOR**, *φιλοπατρις*, formed from *φιλος*, *lover*, and *πατρις*, *father*, in *Antiquity*, a title or surname, assumed by several of the kings of Egypt and Syria, importing, lover of one's father.

Ptolemy Philopator succeeded Ptolemy Evergetes; and had for his successor Ptolemy Philometer. The Syrians had their Seleucus Philopator, Antiochus Philopator, &c.

**PHILOPÆMEN**, in *Biography*, the last great commander among the Greeks, was born at Megalopolis, in Arcadia, about the year 253 B.C. Having lost his father at an early age, he was carefully educated by Cassander, a noble Mantinean, and he received the instructions of two academic philosophers, who instilled into his mind high principles of honour and patriotism. He had from a very early period a passion for military fame, and all the exercises of his youth were directed to the acquisition of martial habits. When of an age to bear arms, he joined those of his townsmen, who employed themselves in incursions upon the Lacedæmonian territory, in which expeditions he was the first to march out, and the last to return. The intervals of war he spent in hunting, and in the cultivation of his own estate. It was when he was about the age of thirty Cleomenes, king of Sparta, surprised Megalopolis by night; Philopæmen exerted himself with the utmost valour to drive him out again, and when he was unable to effect this, at the bazaar of his life he covered the retreat of the inhabitants to Messene. After this he signalized himself in many great actions, engaged as volunteer in an intestine war raging in Crete, and

on his return he was appointed by the Achæans to the command of the cavalry. By his zeal and activity he corrected many abuses which had gained ground in that body, and rendered it famous throughout Greece for superior courage and discipline. In the year 210, he was raised to the station of prætor or commander-in-chief of the Achæan league. After spending some months in improving the military system of the Achæans, with respect to their tactics and armour, he at length led them against Machanidas, tyrant of Sparta, who was marching with a powerful army to invade Achaia. He met the enemy at Mantinea, an engagement ensued, and Philopœmen gained a complete victory. This noble exploit was commemorated by the Achæans, by a brazen statue placed in the temple of Delphi, representing him in the attitude in which he ran his spear into the body of the tyrant. Nabis, the successor of Machanidas, defeated Philopœmen at sea, but he recovered this loss in an action on land, took Sparta, razed its walls, and abolished the laws of Lycurgus. The Messenians having revolted, Philopœmen marched against them, but was taken prisoner by falling from his horse. He was conveyed to Messene, where the people, after the first triumph on their successes, were filled with compassion, at the sight of one whom they had long considered as a hero and benefactor, reduced to that wretched condition. He was inhumanly thrust into a subterranean dungeon, and on the next day an assembly was convened to determine his fate. The people were inclined to favour him, but the senate prevailed and carried a decree to put him to death. An executioner was accordingly sent to his prison with a cup of poison. As soon as the hero beheld him, he raised himself with difficulty from the ground, and enquired whether Lycortas and his companions had escaped; and being assured that they were all safe, he replied, "then we are not entirely unfortunate," and calmly drank the poison, which soon proved mortal. He died at the age of 70, in the year 183 B.C. His fate, which he so little deserved, excited the grief and resentment of the whole Achæan league, and numbers flocked to join a force led by Lycortas to revenge his death. The Messenian people opened their gates without resistance, and put into his hands the authors of the deed, who were reserved as sacrifices to his manes. The ashes of the noble commander were carried in great pomp to Megalopolis, where funeral honours of every kind were paid to his memory. Most of the cities of Greece also erected his statue, with inscriptions recording his great actions. Several years after his death, when Corinth was destroyed by the consul Mummius, a Roman moved for the subversion of all his statues and monuments, as those of an implacable enemy of Rome. Polybius, however, in an eloquent harangue defended his memory, and the consul would not permit such a posthumous insult to a truly great man. Plutarch. Univ. Hist.

PHILOPOLIS, in *Geography*, a settlement of America, in Luzerne county, Pennsylvania, 12 or 14 miles W. of mount Ararat, and at the head of the western branch of Tunkhanock creek, about 45 miles S.E. of Athens, or Tioga point. N. lat.  $41^{\circ} 40'$ . W. long.  $75^{\circ} 33'$ .

PHILOSEBASTUS,  $\varphi\iota\lambda\omicron\sigma\epsilon\beta\alpha\sigma\tau\omicron\varsigma$ , i. e. a friend of Augustus, was a title assumed by several princes and cities, as a public testimony of their attachment to any emperor. This title is found on the marbles of Cyzicum and in other inscriptions.

PHILOSOPHER,  $\varphi\iota\lambda\omicron\sigma\phi\omicron\varsigma$ , a person well versed in philosophy; or who makes profession of, or applies himself to, the study of nature and morality.

When a race of self-created preceptors arose in Greece, who assumed the name of "sophists," or wise men, their

arrogant pretensions gave great offence to such as were capable of distinguishing between real and counterfeit wisdom, and led them to adopt an appellation more suitable to the character of men, who modestly professed themselves to be in the pursuit, rather than in the possession of truth and wisdom, viz. that of philosophers. Cicero ascribes the invention of this term to Pythagoras, and gives the following account of the manner in which it was introduced. Every one knows, that among the Greeks there were seven eminent men, who have since been universally denominated the "seven wise men" of Greece: that, at a still earlier period, Lycurgus, and, even in the heroic ages, Ulysses and Nestor, were called wise men; and, in short, that this appellation has, from the most ancient times, been given to those who have devoted themselves to the contemplation of nature. This title continued in use till the time of Pythagoras. It happened, while this great man was at Phlius, that Leon, the chief the Phliuilians, was exceedingly charmed with the ingenuity and eloquence with which he discoursed upon various topics, and asked him, in what art he principally excelled; to which Pythagoras replied, that he did not profess himself master of any art, but that he was a "philosopher." Leon, struck with the novelty of the term, asked Pythagoras, who were philosophers, and in what they differed from other men. Pythagoras replied, that, as in the public games, while some are contending for glory, and others are buying and selling in pursuit of gain, there is always a third class of persons, who attend merely as spectators; so, in human life, amidst the various characters of men, there is a select number of those, who, despising all other pursuits, assiduously apply themselves to the study of nature, and the search after wisdom: these, added Pythagoras, are the persons whom I call philosophers. Cicero Tuscul. Disp. l. v. c. 3.

This appellation, thus assumed merely through modesty, to intimate that even they who have made the greatest advances in knowledge, are rather to be considered as "lovers of wisdom," than as "wise men," soon lost its original meaning, and was borne with as much haughtiness and vanity, as if it had implied an exclusive right to the possession of wisdom. "Some there are," says Quintilian (Proem. Inst.) "who, despising the occupation of an orator, have employed themselves in prescribing rules for the conduct of life; these have insolently assumed to themselves the title of the sole professors of wisdom."

The sects of philosophers are very numerous; and their dogmata or tenets very contradictory.

Helmont, and some of the chemists, denominate themselves *philosophers by fire*.

The alchemists, and adepts, are frequently denominated the *philosophers*, by way of eminence.

PHILOSOPHER'S Stone, the greatest object of alchemy, is a long-sought-for preparation, which, when found, is to transmute or exalt impurer metals, as tin, lead, and copper, into gold and silver.

Some of the Greek writers in the fourth and fifth centuries, speak of an art, as being then known, of transmuting the baser metals into gold; and towards the end of the thirteenth century, when the learning of the east had been brought hither by the Arabians, the same pretensions began to spread through Europe. It is supposed that this art, called *alchemy*, was of Egyptian origin: and that when the ancient Greek philosophers travelled into Egypt, they brought back some of the allegoric language of this Egyptian art, ill understood, which afterwards passed into their mythology. Alchemy was the earliest branch of chemistry, considered as a philosophical science: in the other parts of  
chemical

chemical knowledge, facts preceded reasoning or speculation; but alchemy was originally speculative. See **TRANSMUTATION**.

The alchemists supposed the general principles of metals to be chiefly two substances, which they called mercury and sulphur; they apprehended also, that the pure, mercurial, sulphureous, or other principles of which they imagined gold to be composed, were contained, separately, in other bodies: and these principles, therefore, they endeavoured to collect, and to concoct and incorporate by long digestions; and by thus conjoining the principles of gold, if they could be so procured and conjoined, it might be expected that gold would be produced. But the alchemists pretend to a product of a higher order, called the *elixir*, the medicine for metals, the tincture, the philosopher's stone; which, by being projected on a large quantity of any of the inferior metals in fusion, should change them into fine gold: which being laid on a plate of silver, copper, or iron, and moderately heated, should sink into the metal, and change into gold all the parts to which it was applied: which, on being properly heated with pure gold, should change the gold into a substance of the same nature and virtue with itself, so as thus to be susceptible of perpetual multiplication; and which, by continued coction, should have its power more and more exalted, so as to be able to transmute greater and greater quantities of the inferior metals, according to its different degrees of perfection.

There are three ways by which the alchemists have attempted to arrive at the making of gold: the first by separation; for it is affirmed, that every metal yet known contains some quantity of gold: only, in most, the quantity is so little, that it will not defray the expence of getting it out.

The second is by maturation; for the alchemists hold mercury to be the basis and matter of all metals; that quicksilver purged from all heterogeneous bodies would be much heavier, denser, and simpler, than the native quicksilver; and that by subtilizing, purifying, and digesting it with much labour, and long operations, it may be converted into pure gold.

This method of maturation is only for mercury: the other metals it is ineffectual for, on two accounts: 1. Because their matter is not pure mercury, but has other heterogeneous bodies adhering to it: And, 2. Because the digestion, by which mercury is turned into gold, would not succeed in other metals, in regard these had not been long enough in the mines.

Weight is the individual and inimitable character of gold, &c. Now mercury, they say, has ever some impurities in it; and those impurities are lighter than mercury. Could those be purged quite out, as it does not appear to them impossible but they might, mercury would be as heavy as gold: and what is as heavy as gold is gold, or at least might very easily be made gold. See *Fixing of MERCURY*.

The third method is, that of transmuting, or of turning all metals readily into pure gold, by melting them in the fire, and casting a little quantity of a certain preparation into the fused matter, upon which the fæces immediately retire, are volatilized and burnt, and so carried off; and the rest of the mass is turned into pure gold. That which works this change in the metals is called the philosopher's stone. See **TRANSMUTATION**.

Whether this third method be possible or not, is very hard to say. We have so many testimonies of it from persons, who on all other occasions speak truth, that it is somewhat

hard to say they are guilty of falsehood, even when they say, that they have been masters of the secret. All required is, they say, to do that by art, which nature does in many years and ages. For that as lead and gold do but differ little in weight, therefore there is not much in lead beside mercury and gold. Now, if I had any body which would so agitate all the parts of lead, as to burn all that is not mercury therein; and had also some sulphur to fix the mercury; would not the mass remaining be converted into gold? There is nothing in nature so heavy as lead, gold and mercury alone excepted. It is evident, therefore, there is something in lead that comes very near to gold. But in lead there is also some heterogeneous matter different both from mercury and gold. If now nineteen ounces of lead be dissolved by the fire, and eight ounces be thus destroyed, they argue that we shall have the rest good gold; the ratio of lead to gold being as eleven to nineteen. If then the philosopher's stone can purify the mercurial matter in lead, so as that nothing shall remain but the pure mercurial body, and you can fix and coagulate this, by means of sulphur, out of nineteen ounces of lead you will have eleven of gold. Or, if you reduce the lead from eighteen to fourteen, you will then have converted it into mercury; and if you farther purify this mercury to its proper standard, you will have gold; provided you have but a sulphur with which to fix and coagulate it. Such is the foundation of the opinion of the philosopher's stone; which the alchemists contend to be a most subtle, fixed, concentrated fire, which, as soon as it melts with any metal, does, by a magnetic-virtue, immediately unite itself to the mercurial body of the metal, volatilizes and cleanses off all that is impure therein, and leaves nothing but a mass of pure gold. Many frauds and artifices have undoubtedly been practised in this operation; and there might be political reasons why princes and others should encourage those who pretended a power of furnishing this inexhaustible source of wealth: but it would be wrong to censure as impostors, all those who have declared themselves convinced, from their own experiments, of the transmutability of base metals into gold. However, there are strong reasons to believe that the authors have been deceived themselves by fallacious appearances. Mr. Boyle gives an account of a process, by which he imagines part of the substance of gold to have been transmuted into silver. (See *MENSTRUUM Peracutum*.) He also relates a very extraordinary experiment, under the title of the degradation of gold by an anti-elixir, which was published in his own life-time, and since reprinted in 1739. Hence many have been led to conclude in favour of the alchemical doctrine of the transmutability of metals. See an account of this experiment, with remarks upon it, by Dr. Lewis, in his *Commerce of Arts*, sect. xii. p. 297, &c.

King Henry VI. granted letters patent to certain persons, who undertook to find out the philosopher's stone, and to change other metals into gold, &c. to be free from the penalty of the stat. 5 Hen. IV. made against the attempts of chemists of this nature. Pat. 34 Hen. VI. 3 Inf. 74. See **ALCHEMY**.

**PHILOSOPHER'S Tree**, a chemical preparation, called also *Arbor Dianæ*, Diana's Tree.

**PHILOSOPHICAL**, something that relates to philosophy.

**PHILOSOPHICAL Æther**. See **ÆTHER**.

**PHILOSOPHICAL Chemistry**. See **CHEMISTRY**.

**PHILOSOPHICAL Criticism**. See **CRITICISM**.

**PHILOSOPHICAL Egg**, among the *Chemists*, is a thin glass body,

body, or bubble, of the shape of an egg, with a long neck or stem; used in digestions,

PHILOSOPHICAL *Month*. See MENSTRUUM and MONTH.

PHILOSOPHICAL *Sin*. See SIN.

PHILOSOPHICAL *Transactions*. See TRANSACTIONS.

PHILOSOPHIZING, the act of considering some object of our knowledge, examining its properties, and the phenomena it exhibits, and enquiring into their causes or effects, and the laws thereof; the whole conducted according to the nature and reason of things, and directed to the improvement of knowledge.

PHILOSOPHIZING, *Rules of, Regula Philosophandi*, as established by sir Isaac Newton, are, 1. That no more causes of a natural effect be admitted than are true, and suffice to account for the phenomena thereof.

This agrees with the sentiments of most philosophers, who hold that nature does nothing in vain; and that it were vain to do that by many things, which might be done by fewer.

2. Natural effects, therefore, of the same kind, proceed from the same causes. Thus, *e. gr.* the cause of respiration is one and the same in man and brute; the cause of the descent of a stone, the same in Europe as in America; the cause of light the same in culinary fire, as in the sun; and the cause of reflexion the same in the planets as the earth.

3. Those qualities of bodies which are not capable of being heightened, and remitted, and which are found in all bodies, where experiments can be made, must be looked on as universal qualities of all bodies.

Thus the extension of body is only perceived by our senses, nor is it perceivable in all bodies; but since it is found in all that we have perception of, it may be affirmed of all. So we find, that several bodies are hard; and argue that the hardness of the whole only arises from the hardness of the parts: whence we infer, that the particles, not only of those bodies which are sensible, but of all others, are likewise hard. Lastly, if all the bodies about the earth gravitate towards the earth, and this according to the quantity of matter in each; and if the moon gravitates towards the earth also according to its quantity of matter; and the sea again gravitates towards the moon; and all the planets and comets gravitate towards each other: it may be affirmed universally, that all bodies in the creation gravitate towards each other. This rule is the foundation of all natural philosophy.

PHILOSOPHY,  $\Phi\iota\lambda\sigma\sigma\phi\iota\alpha$ , the knowledge or study of nature and morality, founded on reason and experience.

Philosophy owes its name to the modesty of Pythagoras, who refused the title  $\sigma\omega\phi\iota\sigma$ , *wise*, given to his predecessors, Thales, Pherecydes, &c. as too assuming; and contented himself with the simple appellation of  $\phi\iota\lambda\sigma\sigma\phi\iota\sigma$ , *quasi*  $\phi\iota\lambda\sigma$ ;  $\tau\eta\varsigma$   $\sigma\omega\phi\iota\alpha\varsigma$ , *a friend or lover of wisdom*.

Chauvin rather derives the name from  $\phi\iota\lambda\iota\alpha$ , *desire*, or *study*, and  $\sigma\omega\phi\iota\alpha$ , *q. d. studium sapientiae*; and says that Pythagoras, conceiving that the application of the human mind ought rather to be called *study* than *science*, set aside the appellation *wise*, and in lieu of it took that of *philosopher*. (See the article PHILOSOPHER.) Which title, St. Augustine observes, took so well with other authors, that whoever excelled in any thing relating to wisdom or knowledge had afterwards no other appellation. Accordingly Socrates, Plato, &c. ever refrained from the swelling title of sophos.

By philosophy we mean the knowledge of the reasons of things, in opposition to history, which is the bare knowledge of facts: or to mathematics, which is the knowledge of the quantity of things or their measures.

These three kinds of knowledge ought to be joined as much as possible. History furnishes matter, principles, and practical examinations, and mathematics complete the evidence. Philosophy being the knowledge of the reasons of things, all arts must have their peculiar philosophy, which constitutes their theory: not only law and physic, but the lowest and most abject arts are not destitute of their reasons, which might usefully employ the time of the studious: and the advantages resulting from this kind of employment has been amply manifested in the discoveries of modern times.

One great obstacle to the progress of arts and sciences has been the neglect of practice in speculative men, and the ignorance and contempt of theory in mere practical men. What chimeras and absurdities the neglect of experience and practice has produced, need not be mentioned; the mischiefs arising from a neglected theory are not so obvious: yet certainly it retards the progress of arts. All invention or improvement must be either casual or rational, including analogy or inference from similar cases, under the term rational. Now, although the foundations of arts have often been owing to some casual discovery, as gunpowder, or the loadstone, yet is this not to be trusted to alone. Improvements do not always flow from this source, but rather from the reflections of artists; and, if these reflections were rendered more distinct, more communicable, and easier to be retained, by the proper use of signs and other philosophical helps, great advantages might be expected: it being certain, that philosophical knowledge is more extensive, and more sure in the application; and, besides, gives a pleasure to the mind not to be expected from that which is merely historical.

It is to be observed, that the bare intelligence and memory of philosophical propositions, without any ability to demonstrate them, is not philosophy, but history only. However, where such propositions are determinate and true, they may be usefully applied in practice, even by those who are ignorant of their demonstrations. Of this we see daily instances in the rules of arithmetic, practical geometry, and navigation; the reasons of which are often not understood by those who practise them with success. And this success in the application produces a conviction of mind, which is a kind of medium between philosophical, or scientific, and historical knowledge.

The ingenious author of the Analyst has gone so far as to suggest, that mathematicians have no other conviction of the truth of the doctrine of fluxions.

We have said that philosophy is the knowledge of the reasons of things. It may be asked, what are the reasons of things, or what is the explanation of phenomena or facts? An ingenious author tells us, that the explication consists only in shewing the conformity any particular phenomenon hath to the general laws of nature; or, which is the same thing, in discovering the uniformity there is in the production of natural effects. This he thinks evident to any one who ever shall attend to the several instances in which philosophers pretend to account for appearances. By a diligent operation of the phenomena within our view, we may discover the general laws of nature, and from thence deduce, though not demonstrate, other phenomena; all productions of this kind depending on a supposition that the Author of Nature always operates uniformly, and in a constant observation of those rules we take for principles; which we cannot evidently know.

If we take a view of the several phenomena, and compare them together, we may observe some likeness and conformity between them. For example, in the falling of a stone to the ground, in the rising of the sea towards the moon, in

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cohesion and crystallization, there is something alike, namely, an union or mutual approach of bodies : so that any one of these, or the like phenomena, may not seem strange or surprising to a man who has nicely observed and compared the effects of nature : for that only is thought so which is uncommon, or a thing by itself, and out of the ordinary course of our observation. That bodies should tend towards the centre of the earth is not thought strange, because it is what we perceive every moment of our lives ; but that they should have a like gravitation towards the centre of the moon, may seem odd and unaccountable to most men, because it is discerned only in the tides ; but a philosopher, whose thoughts take in a larger compass of nature, having observed a certain similitude of appearances, as well in the heavens as the earth, that argue innumerable bodies to have mutual tendency towards each other, which he denotes by the general name attraction, whatever can be reduced to that, he thinks justly accounted for. Thus he explains the tides by the attraction of the terraqueous globe towards the moon, which, to him, doth not appear odd or anomalous, but only a particular example of a general rule or law of nature.

If, therefore, we consider the difference there is betwixt natural philosophers, and other men, with regard to their knowledge of the phenomena, we shall find it consists not in an exacter knowledge of the efficient cause that produces them, for that can be no other than the will of a spirit ; but only in a greater largeness of comprehension, whereby analogies, harmonies, and agreements are descried in the works of nature, and the particular effects explained ; that is, reduced to general rules, which rules grounded on the analogy and uniformness observed in the production of natural effects, are more agreeable, and sought after by the mind ; for that they extend our prospect beyond what is present, and near to us, and enable us to make probable conjectures, touching things that may have happened at very great distances of time and place, as well as to predict things to come ; which sort of endeavour towards omniscience is much affected by the mind. Berkeley's Princ. of Hum. Knowledge, sect. 104, 105.

PHILOSOPHY is a term used in various significations among ancient and modern writers. In its *larger sense*, it signifies the love of truth : thus Plato frequently calls it *philalethia*.

In other places it signifies the knowledge of many things ; thus Zeno calls philosophy, *καταληψις*, *comprehension*, because comprehending all truth. Agreeable to which is Cicero's definition of philosopher, that he is one who studies to know the natures and causes of all things human and divine, and to attend to every good rule and method of life.

Philosophy has been applied by many modern writers not only to all speculative science, but the term has been used so as to comprehend skill in municipal law, the knowledge of medicine, the art of criticism, and the whole circle of polite literature. The term has been even transferred to theology, so that the Christian religion has been called sacred philosophy ; and ecclesiastical doctors and monks have been denominated philosophers.

PHILOSOPHY, in a *narrower sense*, is frequently confined to some one science, or branch of science : *v. gr.* to logic, as we find it in Plato and Aristotle : to physics, or the knowledge of nature ; in which sense it was chiefly used in the Ionic school : and to ethics, or the rules of morality : thus it is Clemens of Alexandria relates that among the Greeks there are philosophers who hold disputes about virtue.

Agreeable to this last application, Pythagoras defines phi-

losophy a meditation on death : by which, according to Plato and Clemens, is meant an abstraction or retirement from the body : which Apuleius thus explains : a philosopher is to study nothing so much as to set his soul at liberty from its correspondence with the body : thus Cicero calls philosophy, *ars vitæ*, and Seneca, *lex vitæ* : and thus Plutarch. Constancy, fidelity, and a sound mind, are the real philosophy ; all the other parts of wisdom, tending any other way, are prettinesses and curiosities : and in this sense it was that philosophy chiefly flourished in the schools of Socrates, afterwards called the *Academic school*, and among the Stoics.

PHILOSOPHY, again, is frequently used by Pythagoras and Plato for metaphysics, or the knowledge of God : which Plato calls the true philosophy, others the *prima philosophia* ; and in respect of which, the Platonists call all other philosophy, *nocturnal*, *νυκτερινη φιλοσοφια*.

Gale includes the several notions hitherto delivered, under this one general definition : philosophy is the knowledge of things natural, moral, supernatural, and notional ; originally granted by God to our first parents, and transmitted to us for the honour of the Creator, and the good of the universe.

The definition of Epictetus is also pretty comprehensive : philosophy, he says, consists in three things ; the practice of precepts, the reason of precepts, and the proof of precepts.

Brucker, in his "History of Philosophy," defines philosophy to be that love of wisdom, which incites to the pursuit of important and useful science. Philosophy discovers and teaches those principles by means of which happiness may be acquired, preserved, and increased : wisdom applies these principles to the benefit of individuals and of society. "Knowledge which is applicable to no useful purpose cannot deserve the name of wisdom."

"Qui ipsi sibi sapiens prodesse nequit, nequicquam sapit."

The sources of that knowledge of truth which leads to the possession of happiness are reason and revelation. To instruct men in those truths which God hath communicated to mankind by revelation is the province of theology ; which see. To teach them such truths, connected with their happiness, as are capable of being discovered by the powers of reason, is the province of philosophy. These two provinces are perfectly distinct, and ought to be kept separate, except where the one may occasionally serve to cast light upon the other. The leading offices of philosophy, says Brucker, may be easily deduced from the general idea of its object. As the permanent enjoyment of real good is the end to be attained, it is the business of philosophy to investigate the nature of good, and the means by which it may be acquired, and so to form and improve the whole man, that he may arrive at the complete possession of true felicity. The business of philosophy will therefore be to cultivate the understanding, and direct its operations : to correct and meliorate the will and affections, by discovering those objects that are discernible, comparing their respective claims, and shewing how they may be rendered most productive of happiness ; to enquire into the causes of natural appearances, and hence arrive at the knowledge of the First Cause, under those characters and relations that are most interesting to mankind ; to conduct men to such an acquaintance with the properties of natural bodies, and their reciprocal actions, as shall enable them to apply the objects around them to their own convenience ; and, finally, to assist them in investigating the principles of social virtue, and so provide them with such rules of conduct as arise from mutual convenience and interest, from the natural sentiments of justice and humanity, and from the voluntary engagements

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engagements of civil society. Dialectics, physics, natural religion, ethics and policy are thus comprehended under the general term philosophy.

From this view of the subject it will appear, that a history of philosophy is a history of doctrines, and of men. As a history of doctrines, it lays open the origin of opinions, the changes which they have undergone, the distinct characters of different systems, and the leading points in which they agree or differ; and it is therefore, in fact, a history of the human understanding. As a history of men, it relates the principal incidents in the lives of the more eminent philosophers; remarks, particularly, those circumstances in their character or situation, which may be supposed to have influenced their opinions; takes notice of their followers, and their opponents; and describes the origin, progress, and decline of their respective sects. It is in this comprehensive manner, that our learned author has undertaken to trace the history of philosophy and philosophers from the earliest records to the present time. And if we may judge of the execution of this important undertaking from the excellent compendium of it given in our own language by Dr. Enfield, it must have required immense labour of research, and it has been rendered in a very high degree instructive and interesting. Our readers will find that we have availed ourselves of this valuable work in various articles of the Cyclopædia.

After fully and modestly stating the manner in which he has proceeded in the accomplishment of his undertaking, the author points out the principal advantages that may be expected from an attention to the rise and progress of philosophy. We shall thus perceive the extent of our intellectual capacities, the causes of their perversion, and the means by which we may avail ourselves for avoiding error, and successfully pursue without deviation the attainment of truth. The history of philosophy serves as a register of discoveries in the world of science, and as a skilful guide towards unknown regions, whither future adventurers may with advantage direct their course. This will also serve to acquaint us with the general sources of science, with the names and characters of valuable authors, the subjects of their works, and the assistance that may be expected from them in scientific researches; so that the history of philosophy is an important branch of the history of universal erudition.

The learned author divides the history of philosophy into three periods; the *first* traces its rise and progress from the earliest times to the establishment of the Roman empire. The *second* represents its state among the Heathens, whilst it flourished under the emperors, which brings the history down to the sixth century; and among the Jews, Saracens, and Christians, from the commencement of the Christian era to the time of the revival of letters. The *third* period relates the attempts which have been since made for the reformation and improvement of philosophy, and describes the various forms which it has assumed from the revival of letters to the last century. Thus the whole history of philosophy is consequently divided into *ancient, middle, and modern*. The *first* period comprehends the Barbaric and the Grecian philosophy: the former including all those nations, which before the time when the Grecian philosophy passed over to the Romans, did not use the Greek language; the latter, all those countries in which that language was spoken. The *second* period exhibits the state of philosophy during the course of 1200 years among the Romans, the Orientalists, the Jews, the Saracens, and the Christians. In the *third* period of this history we see the successful efforts of philosophy to rise above the unwholesome atmosphere of

tyranny, superstition, and bigotry, into the pure regions of freedom and truth; and find the several ancient sects reviving, new and better methods of philosophizing discovered, the chains of authority in some measure shaken off, and farther advances made in true philosophy within the course of a single century, than had before been made in a thousand years. We have thus sketched the plan of this valuable work for the information of our readers, and we shall refer them for particular details to the appropriate articles in the Cyclopædia.

Some have given the following appellations to the ancient philosophy, under its several stages: philosophy, say they, became *impious* under Diagoras; *vicious* under Epicurus; *hypocritical* under Zeno; *impudent* under Diogenes; *covetous* under Demochares; *voluptuous* under Metrodorus; *fantastical* under Crates; *scurrilous* under Menippus; *licentious* under Pyrrho; and *quarrelsome* under Cleanthes.

The several dogmata maintained by the several philosophers are infinite: Cicero makes no scruple to aver, that there is nothing in the world, how absurd soever, but has been maintained by one philosopher or other.

From the first broachers of new opinions, and the first founders of schools, philosophy has become divided into innumerable sects; some ancient, others modern: such are the Platonists, Peripatetics, Epicureans, Stoics, Pyrrhonians, and Academics; and such are the Cartesians, Newtonians, &c. See the rise, doctrines, &c. of each sect under PLATONISM, PERIPATETICS, EPICUREANS, STOICS, PYRRHONIANS, ACADEMICS, CARTESIAN, NEWTONIAN, &c.

Philosophy may be divided into two branches, or it may be considered under two habitudes, *theoretical*, and *practical*.

PHILOSOPHY, *Theoretical*, or *Speculative*, is that employed in mere contemplation, and terminating in it. Such is physics, which is a bare contemplation of nature, and natural things: and it is again usually subdivided into three kinds, *viz.* pneumatics, physics or somatics, and metaphysics or ontologia.

The first considers being, abstracted from all matter: its objects are spirits, their natures, properties, and effects. The second considers matter and material things: its objects are bodies, their properties, laws, &c.

The third extends to each indifferently: its objects are either body or spirit.

In the order of our discovery, or arrival at the knowledge of them, physics is first, then metaphysics; the last arises from the two first considered together: after an acquaintance with God, ourselves, and natural bodies, we come to consider what is natural to them all, or the attributes that agree to all; and thus form a sort of universal philosophy, or doctrine *de ente* in general.

But in teaching, or laying down, these several branches to others, we observe a contrary order; beginning with the most universal, and descending to the more particular. And hence we see why the Peripatetics call metaphysics, and the Cartesians pneumatics, the *prima philosophia*. Others prefer the distribution of philosophy into four parts, *viz.* 1. Pneumatics, which considers and treats of spirits. 2. Somatics, of bodies. The 3d, compounded of both, anthropology, which considers man, in whom both body and spirit are found. 4. Ontosophy, which treats of what is common to all the other three.

Philosophy may be divided into three parts, intellectual, moral, and physical; the intellectual part comprises logic and metaphysics; the moral part obtains the laws of nature and nations, ethics and politics; and, lastly, the physical part

part comprehends the doctrine of bodies, animate or inanimate: these, with their various subdivisions, will take in the whole of philosophy.

Wolfius makes the three parts of philosophy to be the doctrine of God, the human soul, and of bodies. However, when he subdivides, and comes to treat the several branches separately, his divisions readily come under the three heads, intellectual, moral, and physical, before mentioned. The doctrine of God, and the human soul, may be ranged under the same head, metaphysics, the notion of the divine nature being formed from that of the human soul, excluding limitations and imperfections. Muschenbroeck divides philosophy into six parts, *viz.* pneumatics, or the doctrine of spirits; physics, whose object is the universe and the bodies contained therein; teleology, which explores the design and end of the existence of all bodies, and of all their actions and changes, as far as human sagacity can discover them; metaphysics, which comprehends the general and abstract natures and qualities of objects, containing ontology and cosmology, practical or moral philosophy, which lays down rules for the right conduct of life, and the attainment of true happiness; and logic, which unfolds the powers and directs the exercise of the intelligent and reasoning faculty of the human mind.

PHILOSOPHY, *Practical*, is that which lays down the rules of a virtuous and happy life; and excites us to the practice thereof.

Practical philosophy is properly ethics alone, or the method of leading a virtuous and happy life. Yet most authors divide it into two kinds, answerable to the two sorts of human actions to be directed thereby; *viz.* 1. Logic, which governs the operations of the understanding. 2. Ethics, properly so called, which direct those of the will.

PHILOSOPHY *of the Hindoos*. As far as regards metaphysics and logic, it seems likely, from what little hath hitherto appeared, that the Hindoos have some very ancient and curious books expressly on those branches of philosophy, which would be valuable acquisitions to the literature of Europe. Besides regular treatises on these, as well as the other branches, most of their ancient and sacred books discuss scientific subjects, as well as religion and mythology. In the Veda itself, which may be called the Hindoo scriptures, this mixture is met with. One of the Vedas is assigned to a celestial physician; and one of its chapters is occupied with anatomy. (See VEDA.) And under the article *Purana* of this work may be seen how miscellaneous are the contents of the sacred poems, bearing that common denomination. The antiquity of the Hindoo books is a disputable point; but there seems good reason to believe that some of their philosophical systems appeared in nearly their present form, earlier than the date of those European philosophers whose names distinguish theories very similar to those of the Hindoos. There is hence a promise of proof that a great portion of the learning of Greece and Rome was derived directly from India, as well as their mythology, or popular religion. It is this circumstance chiefly, perhaps, that will render the introduction of faithful translations of the Hindoo books so curious and interesting to the literati of Europe; for few are so sanguine as to expect from such a source *much* really useful to us, in our present state of human intellect and ingenuity. We say *much*, in order to abate the indulgence of any unreasonable ardour of expectancy, that suit of course end in disappointment: while to affirm, that *nothing* useful is to be thence looked for, might favour of unbecoming arrogance.

The Hindoos are prone to a *triple* arrangement wherever it can be effected, and we find their principal systems of philosophy classed under three heads, namely, 1. *Nyaya*; 2. *Mimanfa*; and 3. *Sankya*; under each of which words we have offered a brief outline of those several theories. They are ascribed to Godama, Jaimini, and Kapila, of which philosophers, some account is given under their respective names. The above three theories are divided each into two parts; and exclusive of the works assigned to the authors of the systems, all subsequent works are similarly named, according to the school under which the prevalent tenets, that they uphold, may have dictated their arrangement. The same may be said of the commentaries on the original or divided works, and on their imitators or disciples. These commentaries are classed under the denomination of *upadesena*, and have become so voluminous as to obscure, rather than explain, the works of the original philosophers, which are very succinct. The three schools are, as we have seen, divided into six; and may be aptly compared to the principal schools of the west, and their authors with our ancient fathers of philosophy. We offer in one view the names and titles of each, and their corresponding theories; premising that, of course, differences, as well as coincidences, of various sorts will be found, as the works of the Hindoo founders come to be more known. It is to their leading features only that the similitude is intended to be applied, and in these it is often very striking.

- |    |   |               |            |              |             |
|----|---|---------------|------------|--------------|-------------|
| 1. | { | 1. Nyaya,     | Godama,    | Peripatetic, | Aristotle.  |
|    |   | 2. Vaishika,  | Kanada,    | Ionic,       | Thales.     |
| 2. | { | 1. Mimanfa,   | Jaimini,   | } Platonic,  | { Socrates. |
|    |   | 2. Vedanta,   | Vyasa,     |              |             |
| 3. | { | 1. Sankya,    | Kapila,    | Italic,      | Pythagoras. |
|    |   | 2. Patanjali, | Patanjala, | Stoic,       | Zeno.       |

Each of the above words or names has furnished an article in this work, and the enquirer is referred thereto for farther information.

Although most of the works classed in India under these several heads are recognized as comparatively orthodox, yet such a range is occasionally taken by the disciples of all the schools, as to subject them to a charge of heresy from opponents of others, and from the rigid of all theological sects. Another class is, however, generally stigmatized with the epithets of materialists, atheists, &c., and indeed there are also three principal schools of this description, subdivided in like manner as above mentioned, into six, generally called the atheistical systems. "All full," say the orthodox, "of indeterminate phrases, errors in sense, confusion between distinct qualities, incomprehensible notions, opinions not duly weighed, tenets destructive of natural equality, containing a jumble of atheism and ethics; omitting what ought to be expressed, and expressing what ought to be omitted; abounding in false, idle, and impertinent propositions."

We cannot detail either the tenets or the titles of such works or systems. As a specimen we refer to the article NASTICK, the name of one of these schools, otherwise called Charvaka, from the name of its founder. See also under BOODI, JAINA, &c. articles thence referred to.

PHILOSOPHY, *Mental*, or the *Philosophy of the Human Mind*, is that branch of science which investigates the laws of the human mind. Its object is to ascertain the properties of the mind, the origin of its various modes of thought and feeling, the ways in which they operate upon each other, and the means by which they are to be cultivated or repressed.

Mental philosophy is not uncommonly confounded with metaphysics;

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metaphysics; and the absurdities and fertile speculations which have been classed under the latter, have been supposed by many to belong to the former. *Metaphysics* (*μετα τα φυσικα*) comprehends all those investigations which have for their aim the properties, classification, and laws of such objects of human thought as by sensation alone could not be brought under the notice of the mind; and it consequently includes the philosophy of the human mind; but it is obviously unjust to throw upon this branch of metaphysics, the stigma which, if due to any, belongs to those branches alone, which have no relation to our mental laws and operations. The ancient metaphysics comprehended many objects which can scarcely be said to lie within the sphere of human knowledge, and which are rather to be considered as the reveries of imagination, than as the realities of intellect; but these the good sense of the present day regards merely as objects of curiosity, notwithstanding the efforts of the learned Harris and others to bring us back to all the philosophical vagaries of antiquity. Excluding these, however, (with which the science of metaphysics is no more chargeable, than physical science is with the vortices of Des Cartes,) we are disposed to allow a high rank to a few only of those objects of metaphysical research which do not justly class under the head of mental philosophy. We regard them, in general, as only amusing speculations, which may serve to sharpen the activity of the intellect; but we are no advocates for the young philosopher spending his exertions upon them.

Whatever relates to the properties of the mind, to the operations of intellect and affection, is of high value in various points of view. The philosophy of the mind, as Mr. Stewart justly remarks, abstracted entirely from that eminence which belongs to it in consequence of its practical applications, may claim a distinguished rank among those preparatory disciplines which bishop Berkeley has happily compared to "the crops which are raised, not for the sake of the harvest, but to be ploughed in as a dressing to the land."

The object of moral philosophy is to shew men their duty, and the reasons of it. It teaches what regulation of the conduct and the affections is our duty, why it is our duty, and how it is to be acquired. It is sufficient barely to state these objects, to shew at once the subserviency of mental to moral philosophy. The foundations of the science of morality can only be laid, with success, on a judicious acquaintance with the principles of the mental constitution. We must know what are the affections in which moral excellence consists, how they are to be formed and cultivated, and how opposing ones are to be repressed or exterminated. Even where morality respects the external conduct, the reasons of it must be sought, among other sources, in our mental principles. How actions affect our own happiness or that of others, can only be fully shewn by mental philosophy, or by that experimental acquaintance with the phenomena of mind on which its laws are founded.

Nor less important is an acquaintance with the principles of our mental constitution to the business of self-inspection and self-culture. "The philosophy of the human mind, (says Mr. Belsham,) teaches man to know himself, and to improve, direct, and exert his intellectual faculties in a manner the most beneficial to himself and others. In particular, it impresses a just sense of the dignity of our rational nature, and the great end of intellectual existence; it directs to the best method of cultivating the mental powers, of preventing or correcting prejudice and error, and of enlarging the stock of useful knowledge. By analyzing the principles of action, and tracing the origin and progress of affection, habit, and character, it leads to the proper disci-

pline of the heart, and supplies the most efficacious means of correcting all undue bias of self-love, of resisting the motives to vice, of restraining the exorbitance of the passions, of cultivating virtuous principles, and of attaining that just and beautiful symmetry of the affections, that elevation of mind, and disinterestedness of character, which, when combined with vigour of intellect, and comprehension of views, constitute the true dignity and happiness of man." *Elements of the Philosophy of the Mind*, p. 2.

A sound and comprehensive acquaintance with the laws of our mental frame, is of incalculable utility in the business of education. It gives to those who conduct it, correct views as to its objects. It shews the vast importance of early impressions, of early attention to the culture of habits and dispositions. It points out the best means for forming those characteristics of intellect and affection, which are essential to happiness and usefulness. On this point see *INTELLECTUAL and MORAL Education*; and also Mr. Stewart's *Elements*, *Introd.* part ii. § 1. The philosophy of the human mind is to education, precisely what medical science is to the physician. A person who has stored up the maxims and recipes of former practitioners, and possesses an active discriminating mind, may do wonders without an acquaintance with the structure and physiology of the human frame; but for one instance in which we find a person ignorant of medical science judiciously employing means of cure judiciously chosen, we meet with thousands in which the practice is unsteady, irregular, inconsistent, casually perhaps beneficial, but more frequently injurious. And, at any rate, the most successful of such practitioners would certainly have been more regularly successful, if they had possessed a sound and extensive acquaintance with the structure and functions of the body, the nature of diseases, the effects of certain substances upon the bodily system, &c.

We might go on much farther in shewing the practical advantages of mental philosophy; but we have already offered a few remarks on the subject in the last column of *INTELLECTUAL Education*, to which we refer our readers; and we shall only observe here, that an acquaintance with the principles of this important science, enables us more correctly to appreciate the inestimable value of Christianity, and the strength of the evidences on which it is founded. It leads to the most interesting conclusions respecting the worth of Christian precepts, and the exalted nature of Christian motives. It shews us how Christianity "reconciles human nature to itself;" and it shews us that the truth of it rests upon the well-known laws of the human mind. It directly furthers the cause of religion in general, by rendering more obvious the reasons of the divine dispensations, and by the various displays of goodness and wisdom which our mental phenomena present to us. It tends, beyond all other branches of philosophical investigation, "to correct, enlarge, and exalt our conceptions of the attributes and character of the Supreme Being, and to lay a foundation for the most rational and exalted piety."

We cannot even attempt to lay before our readers a complete system of this important science. However brief it might be made, if it were as comprehensive as the subject requires, it would probably be considered as occupying a disproportionate share of our work. What we shall aim at is to give such a view of the leading principles of our mental frame, as may assist to direct the thoughts of the inquirer into the right channel, and serve as a foundation for his own investigations. In the study of mental philosophy, our success must ultimately depend upon the attentive examination of what passes within ourselves; and it is only so far as the observations of others on the phenomena and laws of the mind

are borne out by such examination, that we can feel a reasonable satisfaction in their correctness.

As to the proper conduct of our philosophical enquiries, in investigating the laws of the human mind, we have great satisfaction in referring to some of the statements of Reid and Stewart. We regret to see, in various passages from the pen of the latter of these philosophers, when speaking of the principles of Hartley, a tone of censure, (sometimes bordering on contempt,) which is clearly founded on misapprehension. This we shall hereafter have occasion to notice more specifically. In several of Mr. Stewart's more general positions, we also widely differ from him. But the reader of this article will have opportunities of perceiving, that there are some extensive and highly important portions of his Elements, to which we can yield an entire approbation. Among other things we cordially agree with him in his wish to separate between important and well-ascertained truths, and principles which rest wholly on conjecture. "The metaphysical opinions which we may happen to form respecting the nature either of body or of mind; and the efficient causes, by which their phenomena are produced, have no necessary connection with our inquiries concerning the laws, according to which these phenomena take place." Without pretending to ascertain the bounds beyond which human intellect cannot pass, it appears to us certain, that in the present state of mental philosophy, we can advance no farther with safety or practical utility, than the registering and classification of phenomena, the deriving from them those conclusions which may be regarded as general laws of the human mind, and the application of these laws to explain other phenomena, and to determine the probable result of the operation of our mental principles, in cases where the previous circumstances are known. The grand point in mental as well as in physical science is, to observe correctly, to discriminate accurately, and to generalize with caution.

When the attention of the mind is directed to its own states and operations, (whether these are directly intentional, semi-voluntary, or the result of habit or external impression,) it is termed *reflection*. The capacity of reflection, on what passes within us, is seldom perceived very early; and agreeably to the obvious order of nature, it ought not to be predominant till the world without us has furnished abundant materials for our mental operations: but Dr. Reid is certainly mistaken when he asserts (*Intellectual Powers*, *ess. i. ch. 5.*) that "the power of reflection upon the operations of their own minds *does not appear at all* in children." We have noticed it in a child of four or five years old, in some very decisive cases; and, in various other instances, in children under ten or twelve. We are no advocates for the premature or excessive culture of reflection; but the rudiments of the habit should be early *begun*, with a view to moral culture; and no one can doubt that mental philosophy can be successfully pursued, only where the attention of the mind can be directed inward, and its own thought and feelings, and modes of thinking and feeling, made the subject of examination. Some at the commencement of their mental investigations may find this a task of great difficulty; but the more it is attempted, the more easy it will become; and when the habit has been in any considerable degree acquired, it will in various ways reward itself. It is this difficulty which so generally operates to prevent the study of the human mind. Though in some respects the mental philosopher has great advantage over the natural philosopher, (requiring, for instance, no apparatus, no rare or expensive substances to submit to examination,) yet the investigations of the former must, from the very nature of their objects,

be attended with obstacles which in no way affect the latter. The fleeting nature of our notions and feelings, and the extreme difficulty, in many cases, of separating the operations of thought from those of language, constitute some of the leading causes which impede our success in this department of science; and these are made still more efficacious, by the difficulty of avoiding, in our explanations of mental phenomena, illustrations derived from the objects of sensation. Nevertheless, the leading principles of the mind are not obscure or difficult to be investigated; and where these are once fully established, and the inquirer is guided by them in his researches, he cannot but attain results which will prove of great practical utility; while at the same time he will find sources of interest not surpassed by any which present themselves to the physical philosopher.

It might not be unattended with considerable benefit to lay before our readers a connected view of the leading systems which have been adopted respecting the operations of the mind; but it is not necessary for our object; nor will the limits we must submit to permit it. Those of our readers who are desirous of seeing the opinions of the principal metaphysicians, ancient and modern, on the subject of our mental faculties, ideas, &c. will find a great fund of valuable information in Dr. Reid's *Essays on the Intellectual Powers*, especially in the second.

While we thus refer to Dr. Reid, we think it necessary to state that we cannot accord with the leading features of his philosophy; and it is clear that he fell into the common error of regarding the hypothesis of vibrations, as an essential part of the Hartleyan system. We regard it as an incumbrance on the system; and we are satisfied that no candid reader of the *Observations on Man* will say that Hartley in any degree invests it with the importance which he justly attaches to the doctrine of association. It is *this* which constitutes his system; and it is *this* on which he rests his Rule of Life: and however groundless the hypothesis of vibrations may appear, or may really be, the grand law of association is in no way whatever affected.

Into the leading principles of the Hartleyan philosophy, Dr. Reid seems scarcely to have entered. Indeed he was not likely to see their force; for they rest upon a foundation diametrically opposite to what he regards as the grand peculiarity of his own philosophical opinions,—that our perceptions necessarily imply the belief of the present existence of the external objects of them, and that these are the *immediate* objects of perception. In endeavouring to overturn opinions from which absurd conclusions have been unjustly drawn, Dr. Reid has been led to deny what appears to us the most obvious fact, (entirely independent of the theories of Locke and Hartley,) that there are in the mind objects of thought distinct from the external causes of their production. Numerous valuable observations are scattered in various parts of Dr. Reid's writings; and the advanced student of mental philosophy may read them with pleasure and profit; but as far as his opinions are founded upon the hypothesis that there are not in the mind any objects of its operations distinct from those acts or operations, we cannot hesitate in pronouncing them visionary in the extreme. If we had to choose between two theories, the immaterial system of Berkeley, and the non-ideal system of Reid, we should be compelled to adopt the former; for we could sooner doubt the existence of external causes of our sensations, than we could the existence of our ideas. We are conscious of thoughts and feelings, of notions and conceptions, the objects of our mental operations, of recollection, association, comparison, reflection, &c.: and we could as soon doubt our own existence as theirs. We admit that by

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the essential laws of the mind, if a human being have five senses, and the power of locomotion, the conviction will necessarily be produced in his mind, (let philosophy struggle against it as it will,) that there are external objects causing (or occasioning) his sensations. As conceptions, however, sometimes have the vividness of sensations, and in disordered states of the system are accompanied by the same belief, the possibility that all our notions of external objects are alike groundless might be admitted; but that we have such conceptions and sensations is an unquestionable fact.

Mr. Stewart, in his Chapter on Perception, appears to be extremely embarrassed between the leading principle of Dr. Reid, and the plain matter of fact. He virtually gives up that principle in various parts of his Elements; and he seems to hesitate respecting it where it unavoidably comes under review. Perhaps it is not unreasonable to conjecture, that had he been less conversant with the investigations of Condillac, he would have been more shackled by the restraints which his venerable and amiable instructor had thrown upon philosophical enquiry, and more turned from the true principles of the mind, by the bias which the strange opinion we have adverted to must necessarily have given to his researches. It was impossible for Dr. Reid to have received the doctrine of association, while he denied the existence of intellectual objects of thought separate from the acts or operations of the mind: and the influence of his principles, together with the unfortunate point of view from which Mr. Stewart considered the Hartleyan philosophy, are sufficient to account for the fact that this philosopher regards some of the most profound and successful investigations of our mental principles, as little better than reveries. See life of REID, and elsewhere.

Locke was not sufficiently guarded in his modes of expression, and perhaps was not sufficiently precise in his notions respecting *ideas*; and he has given Dr. Reid some room for placing his opinions on a footing with the fantastic theory of Aristotle and his followers. We see, however, no adequate reason whatever to conclude that Locke believed in the hypothesis of Aristotle as to the nature of *sensations* and *ideas*, or that he meant in any way to represent them as the ancient metaphysician does his *sensible species*, *phantasms*, and *intelligible species*. Dr. Reid does, indeed, say, (Ess. i. ch. 1.) that Mr. Locke "tells us, that he means the same thing by it (*idea*) as is commonly meant by *species* or *phantasm*," (which, however, would in no way prove his referring to the proper *Aristotelian* meaning of those terms); but Locke says more than this; and though Dr. Reid's great candour of mind must have prevented his intentionally misrepresenting his meaning, yet our readers will agree with us in the opinion that he has done so most essentially, when we quote a passage (probably, indeed, the one referred to, and which Dr. Reid himself afterwards quotes) from the Introduction of his Essay, § 8. "I must here, in the entrance, beg pardon of my reader, for the frequent use of the word *idea*, which he will find in the following treatise. It being that term which, I think, serves best to stand for *whatsoever is the object of the understanding, when a man thinks*, I have used it to express whatever is meant by *phantasm, notion, species, or whatever it is which the mind can be employed about in thinking*; and I could not avoid frequently using it. I presume (continues our great philosopher) it will be easily granted me that there are such ideas in men's minds: every one is conscious of them in himself, and men's words and actions will satisfy him, that they are in others."—We cannot admit that Locke's principles as to the nature of our ideas, had any thing in common with those of the Platonists, or of the

Peripatetics. He may resemble them in some of his terms and *illustrations*; and in using the latter he has exposed himself to misapprehension and censure (see Reid's Ess. ii. ch. 4.), and probably has contributed to make obscurity more obscure. But while Dr. Reid has successfully combated the hypothesis of Aristotle and his followers, he has left the grand structure of Locke's philosophy uninjured. This has its foundation in human nature; and what Dr. Reid has advanced to overturn its fundamental axiom, (which we have just stated,) appears to us to be directly in opposition to the plainest principles of common sense. You think of a departed friend, and memory retraces a conception of his venerable form, as distinct as if his picture, as if he himself, were before you. You see him with the "mind's eye;" and you are not conscious of any impressions from external objects, though thousands of them have their images depicted upon the external organ of sight. You hear, in imagination, the tones of friendship with which he gave you the counsels of wisdom; you even hear the words in which he clothed them; and the sounds from without do not at all affect the mind. You think of his virtues, of the displays of his tender affection; and as memory with rapid glance carries you from one scene of goodness to another, you feel the emotions of gratitude, of respect, of love. And yet these conceptions, these notions, these feelings, are (if Reid be right) without existence; there are no such things; there is nothing but the mind and its operations, and the external objects on which its operations are employed!—Whether or not the organs of thought be material, with which the ideal system is in no way concerned, (but which, as the editor conceives, affords a strong presumption, that they are not material,) we cannot hesitate in maintaining, as a self-evident position, that the *objects* of the *percipient* principle and its *operations* are perfectly distinct.

The great principle of Dr. Reid's philosophy, is, in our apprehension, utterly untenable; it may, however, have contributed finally to exclude from mental philosophy the phantoms of the ancients, which alone he appears to us to have been combating. The Platonic doctrine of ideas is to be regarded as a system of philosophy respecting rather the divine than the human mind. It does not appear to have been the object of its founder to explain the origin of sensations and ideas. According to Plato (see Reid's Ess. i. ch. 1.) ideas were "eternal immutable forms or models, according to which the Deity, of an eternal matter, made every species of things that exists."—"The mind of man, in order to its being fitted for the contemplation of these eternal ideas, must undergo a certain purification, and be weaned from sensible things. The eternal ideas are the only object of science; because the objects of sense being in a perpetual flux, there can be no real knowledge with regard to them." The Alexandrian Platonists held that these ideas were not a principle distinct from the Deity, but the conceptions of things in the divine understanding.

Aristotle clearly had in view to explain the origin and nature of ideas and sensations. With the light we possess on the subject, his notions appear in some respects absurd enough; but taking into account the nature of the philosophy then in vogue, it must be admitted that they are at least ingenious. Plato's theories are more like the reveries of a poetic imagination, and are purely metaphysical: Aristotle attempts something like mental philosophy; for which see PHANTASM.

It is easy to comprehend how a vigorous mind, like that of Aristotle, capable of forming distinct and vivid concep-

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tions, and of making the objects of thought the subject of close contemplation, might fall upon this hypothesis. The laws of light and the nature of vision being so little understood, it was a natural error to suppose, from the analogy of the other senses, that the visual organ was affected by something coming off from the object, which produced an image or form of it in the mind; and as distinct images or conceptions of external objects can be reproduced without fresh sensations, it was equally natural for them to imagine that those images were the original immaterial forms somewhat refined by the agency of the mind itself. Aristotle had, probably, no definite notion of *ideas* derived from any other source than the light. There are, in fact, very few who can form *conceptions* of any but *visible* objects; and Aristotle, habituated to deep reflection on the objects of knowledge, and the processes of his own mind, must have been less likely than others to form conceptions of sound; and as he could have known nothing of the way in which the more refined ideas are formed, by association, from a variety of simple ideas, often derived from the sensations of two or more senses, it was the most direct inference he could make, (as he supposed all ideas to have been derived from sensation,) that the most refined ideas were the forms or species spiritualized. Separate from the hypothesis as to the way in which the organs of sensation are affected, and the manner in which sensations are refined, there is a great deal of substantial truth in his theory; and if Dr. Reid had been less bent upon overturning the sceptical philosophy, he might have been led, even by Aristotle's notions, to some important conclusions on the subject of ideas, which he has now, in opposition to his own principles of common sense, utterly lost sight of. If we had only to choose from the non-ideal system of Reid, the immaterial system of Berkeley, and the species of Aristotle, we should prefer the latter, as on the whole most agreeable to what we, and we presume, all men, feel and believe, as to what passes within us and without us.

While reflecting upon Dr. Reid's fundamental principle, which contributes so essentially to lead away the minds of his followers from perceiving the full extent and importance of the doctrine of association, we often feel disposed to imagine that we do not ourselves comprehend his hypothesis. But view it in what light we will, we are compelled to come to the same conclusion, that when opposing the ideal system of LOCKE, either his opinions are contrary to fact and common experience, or his statements are founded on merely verbal distinctions. At any rate, what he says against Locke's ideal system in no way affects our own; for what he terms *notions* and *conceptions* (Ess. ii. ch. 14, &c.) we regard as comprehending the whole round of the *ideas* of the understanding. And if his theory allows, (what we regard as an indisputable fact,) that it is possible for the mind to form a *conception* (or, if we might be allowed, by way of illustration, to call it a *picture*) of something which has no real existence in nature,—to dwell upon this conception till it acquires a degree of vividness and strength which shall make the mind, for the time, utterly unconscious of the external objects which affect the organs of sense,—and, in diseased states of the understanding, to believe it to be a sensation derived from an external object, and to think and act as if it were really such,—then the warmest advocate of that theory must, one would suppose, farther admit, that it leaves the Berkeleyan theory unaffected in its leading positions, and that the dictates of common sense and common philosophy here agree, that when the mind is thinking it thinks about something, and that that something is distinct from the operation of thinking, and may have no archetype

in the whole round of spiritual or material substance. And if that point is conceded, it necessarily follows, that (though much remains in Dr. Reid's works which is truly valuable) his peculiar fundamental principle has a merely verbal importance, or is altogether groundless.

Mr. Locke had the great merit of establishing a position which lies at the foundation of mental and moral philosophy, that *there are no innate principles in the mind*. Like the doctrine of instincts, that of innate ideas could not but fall before an enlightened yet cautious examination of any mental principles. We are so constituted by the great Author of our frame, that in the circumstances in which mankind in general are placed, certain notions will be formed, and certain affections will spring up in the mind. If we are at once rest satisfied with the fact, there is an end to philosophical investigation; if we call them innate or instinctive, we do worse; because in the one case we are only in ignorance, in the other we cover our ignorance with a delusive show of knowledge. Whilst, with philosophical caution to examine into the origin of them, we may be led to important and just conclusions; but if we cannot ourselves get to those conclusions, we ought not to throw impediments in the way of our successors in the walks of intellectual inquiry. We are, however, arrived at that period of mental progress, where these contented appeals to ignorance are deservedly neglected. Since the time of Locke, no philosopher, we believe, has ventured into the regions of darkness, to account for what his luminous principles at once explain; and in proportion as the doctrine of association is thoroughly understood in its full extent, will it be found unnecessary to resort to instinct, (in other words to an occult cause, occult in its nature and in its operations,) to account for our intellectual and moral phenomena.

We think it unnecessary to enter at all into the consideration of the hypothesis of innate ideas. Locke's Essay is probably accessible to all our readers; and we refer them to his introductory chapters, if they have any doubts on the subject. On the hypothesis of instincts we shall have occasion to say a few words hereafter; but we are satisfied that no one who goes along with us in our leading positions respecting the theory of association, will resort to a notion so destitute of all support from the acknowledged principles of the mind. If the law of association does not yet account for all the phenomena once referred to instinct, it clearly and satisfactorily explains so much, and by analogy affords a clue to so much more, that it is, to say the least, much more prudent to wait for farther light on the subject, than to put an end to inquiry, by maintaining that we have in any instance reached an ultimate *instinctive* principle, or mode of operation in the human mind.

Universal belief affords no infallible test of truth; but when it respects practical principles, it furnishes to the religious philosopher a presumption in favour of those principles, and will prevent him from too hastily deciding against them. Such belief presents a reasonable ground for supposing, that they originate in the laws of our frame, under the influence of circumstances common to all mankind; and where this is the case, the voice of nature may be justly regarded as the voice of God. And the same may be said respecting the natural affections. We perceive with pleasure that our ideas here coincide very much with those of Mr. Stewart (Phil. Ess. p. lxxviii.), and we earnestly hope that that philosopher will complete his proposed investigations.

But such reasoning cannot affect the Berkeleyan philosopher. Indeed there are between him and the vulgar herd no common principles. All that he hears and sees is solely the world of his own mind; and he must either be consistent beyond,

beyond, we suppose, possibility, or act utterly inconsistently with his own principles, if he use what we should call his corporeal organs to increase his store of ideas. If, however, he should be guilty of such inconsistency, as to think of this book as something out of himself, marked with some material substance by a being like himself, so as to convey the ideas which another such being has in his mind, we wish to suggest the following enquiries to him; and at any rate we suggest them for the satisfaction of those who with ourselves imagine that there are external objects, distinct from the mind itself, occasioning its sensations.

In the first place, we wish to have a clear distinction preserved between our inability to give a completely satisfactory reason for any opinion, and the absolute groundlessness of that opinion. Multitudes who believe in Christianity might easily be puzzled by the acute sceptic; and be unable to produce a correct reason for their belief though others could, and though in their own minds there were actually existing the rational grounds of such a conviction. Next, in balancing between two inconsistent hypotheses, we are to consider not merely whether each will equally well account for one set of phenomena, but also whether there are any for which one will account and the other not. We do not deny that the mental philosopher has not yet reached that complete analysis of our internal principles, of our notions and feelings, as would enable him to point out, in all cases, how each would be formed in the mind. He is not as yet able to shew in a completely unobjectionable manner, how the popular belief is produced; though we are of opinion that Condillac, in his *Traité des Sensations*, has afforded the means of making great progress towards it. But this does not prove the belief false. The opinion involves no absurdity. It is not inconsistent with itself, or with any known phenomena. It accounts for all we know, at least as well as the Berkeleyan hypothesis. And, on the other hand, this hypothesis is opposed by every sensation we experience from the touch, or from the other senses, if it is accompanied with associated ideas derived from the sense of feeling; and if this be denied, it must be admitted to be utterly inconsistent with a phenomenon of vast extent; *viz.* that the existence of external objects is doubted by none who are left to the dictates of plain good sense, that it is expressly believed by all such persons, if they think at all on the subject, and that notions of external objects, *considered as such*, are continually in the mind of every one.

The simple state of the case is, that though it is possible that there may be no external world, occasioning our ideas, &c., and though we cannot exactly explain the formation of the universal belief that there is; yet, on the other hand, the hypothesis that there is, is perfectly accordant with all the known phenomena of the mind, and is necessary to account for one which the opposite hypothesis can in no way account for, and with which it is even directly inconsistent. If we can go no farther, we can at least say that the human mind is so formed, that the belief in the existence of external objects must spring up in it; that the practical belief in it cannot be destroyed without a derangement of the mental functions; and that even the speculative belief in it will only give way to a mode of reasoning, which introduced into real life would make human conduct full of absurdity and danger. We must, however, again observe, that some progress has been made in shewing the ground of this belief; and that, admitting the existence of external objects, it is not difficult to perceive how the principle of association must produce the belief, by combining the impressions produced on the mind through the organs of feelings, aided by the power of locomotion.

In what follows we shall therefore take for granted,

1. That there are external objects causing or occasioning sensations.
2. That these objects do not send off from them immaterial forms, which, when conveyed into the mind, produce sensations, and are afterwards refined by our mental faculties into phantasms, &c.: nevertheless,
3. That *there are objects of thought in the mind, distinct from the operations of the mind*, such as conceptions, *e. g.* distinct from the operation of conception, and notions recollected, distinct from the act of recollection: and,
4. That none of these objects of thought are innate; but are all derived from sensation, or from reflection on the operations of our own minds.

The fourth rests for its foundation on the leading principles of Locke's Essay. For proof of the second, we refer to ascertained facts connected with the structure of the body, and the common principles of optics. The third we must leave to the reader's own consciousness. And the first we are contented to rest upon universal belief, or, if the term be preferred, common sense, in connection with the arguments just advanced on the subject.

I. *General View of the Faculties of the Mind.*—That, whatever it be, which thinks, and feels, and wills, is called *mind*; that part of the human being which thinks, and feels, and wills, is called the *human mind*.

We observe, without us and within us, numerous phenomena: the object of philosophy is to deduce from them those general laws, agreeably to which they are produced; and then to employ those laws in the explanation of other phenomena. Mental philosophy pursues the same method which has been so successfully adopted in natural philosophy; and as in physics, similar phenomena are referred to the operation of some one cause or power, so in mental science, those phenomena which have all one common feature are referred to some faculty or property of the mind, by whose operation these phenomena are supposed to be produced. What is the nature of those mental or physical powers, philosophy does not profess to explain.

If we hold a luminous body before the eye, it produces some change in the state of that organ, and this produces in the mind a feeling: this feeling is called a *sensation*. This name is also given to all those other feelings which are produced in a similar way, *viz.* owing to a change in the organs of sense, whatever be the cause by which the change is produced. The general fact or law is, that sensations are produced by what affects the organs of sense. Now to account for this fact, we infer that the mind is possessed of a power or capacity which we call *sensation*, or better, to avoid ambiguity, the *sensitive power*. This, then, is that power or capacity of the mind, by whose operation it receives sensations from things which affect the organs of sense.

We know, as a matter of fact, that though sensations cease soon after the exciting object is withdrawn, yet if they have been produced sufficiently often or vividly, the causes of feeling, similar in kind, remain in the mind; and those similar feelings can recur, when no change is produced in the organs of sense. These are called *ideas*: they are the *relics of sensations*. Such is the general law or fact. The operation, or act of retaining relics of sensations, may, with the strictest propriety, be termed *retention*; and to account for it, we infer that the mind possesses a power or capacity, which we may term the *retentive power*. This, then, is that power or capacity of the mind, by which it retains relics of sensations.

Again, it is an indisputable fact, that these ideas, or relics of sensations, do not remain single in the mind, but become

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become connected with one another, so that the recurrence of one, or of its corresponding sensation, will bring on another; and that in certain cases they become so blended together, that the parts can scarcely be distinguished. Thus the word *orange*, either pronounced or thought of, will bring up the idea of the appearance of an orange. Again, the idea of the word *house* is accompanied by a certain feeling, which is altogether different from that which accompanies the idea of the word *ship*. If we think about it a little, we usually have the idea of a particular house recalled: this is a *simple idea* (or *idea of sensation, or conception*), connected with other ideas, but not *combined* with them; but, in general, if the word occurs without the mind dwelling upon it, we may perceive an indistinct feeling, which is composed of a variety of simple ideas, received from a variety of those objects to which we give the name *house*. That the feeling is thus composed, we have a full right to assert, on an attentive consideration of the customary processes of the mind. Simple ideas may then be *connected* with other ideas; or they may blend and *coalesce* with other ideas, so as to form new ones, which are called *compound* or *complex ideas*. The general fact is, that connections and compositions take place among our ideas; and when thus connected or compounded, we say that they are associated together; and the connected or compounded group we call an *association*. To account for the formation of associations, we infer that the mind possesses a power or capacity of connecting or combining ideas, which may be called the *associative power*. This, then, is that power or capacity of the mind, by which it connects and compounds ideas.

Farther: it is obvious that without any external excitement of the nerves by which muscular motion is produced, the mind can produce such motion; in other words, that state of the motory nerves by which muscular motion is effected, can be produced by the mind. We do not here enquire how the mind learns to use its influence over the motory nerves; but state the fact, that muscular motion can be produced by the mind without external excitement. To account for this, we infer that the mind possesses a power or capacity of influencing the motory nerves so as to produce muscular motion, which may be called the  *motive power*.

There is no term appropriate to those states of mind which produce the changes in the motory nerves requisite for muscular motion; and we are therefore so far free from a difficulty which has accompanied us when speaking of sensations and ideas. These terms, as most commonly used, imply that the consciousness of the mind is excited: but it appears to us an almost indisputable fact, that the mental organs, whatever they be, by whose action the consciousness is excited, are often in a state of activity without such excitement of the consciousness; in other words, that those changes, which, when accompanied with consciousness, are termed sensations and ideas, may take place, and produce an effect in the mental system, without exciting the conscious or percipient principle. In order to enter into the consideration of this fact, which in some points of view appears to us important, it will be necessary to consider somewhat more explicitly in what manner we employ the term *mind*, and to introduce some less customary terms in order to avoid ambiguity.

In the philosophical sense of the term *mind*, it seems to belong exclusively to the conscious or percipient principle, whatever that be; but in common language we certainly employ it differently: *e. g.* no one hesitates in saying, "such a man has an extensive store of knowledge in his mind;" but no one supposes that at any one time a man

perceives, that is, is conscious of, all the parts of that knowledge. In the same manner, no one would hesitate in saying, "such a person has a great fund of valuable reflections for the conduct of life stored up in his mind, which he can produce whenever circumstances call for them;" but no one supposes that those reflections are always in the view of his mind, that is, that he is always conscious of them, that he always perceives them. All that can be meant in such cases is, that the causes of his ideas (that is, of his notions, conceptions, and feelings,) remain in the mind ready for excitement, when they produce ideas. Hence, then, the mind, in the common acceptance of the term, in which we use it, consists of two parts; the conscious or percipient principle, and the organized substance, which furnishes to the former the objects of its consciousness or percipiency. What the conscious or percipient principle is, is probably known to him only who formed it: we may believe consciousness or percipiency to be a property which is the necessary result of, or added to, a certain organized system of matter; or we may believe it to be a property of some substance essentially different from matter; and we apprehend it is not of very much consequence which opinion is adopted: but it seems indisputable, that in the present state of knowledge, we cannot obtain, on either side, more than a bare preponderance of probabilities. See on this subject the articles MATTER and SPIRIT.

That organized substance, which, without any farther medium, furnishes to the conscious or percipient principle the objects of consciousness or percipiency, may be called the *sensorium*. The parts of which the sensorium is composed, by whose changes, without any further medium, consciousness is excited, may be called the *mental organs*. By the mind we understand the whole together, the conscious or percipient principle, together with the sensorium; leaving it undecided, whether consciousness is a property of organized matter, or belongs to a substance essentially different from matter; and also, whether the sensorium be or be not the medullary substance of the brain. (See SENSORIUM.) Hartley, as is well known, adopts the affirmative in the latter case; and he supposes that the changes of the sensorium which affect the consciousness, are vibrations of the medullary substance. We consider this hypothesis as a clog upon, at least, the adoption of his grand system of association; and we should prefer the more general term *motions*, if we professed to decide respecting the nature of the sensorium: as we do not, we shall employ the still more general term *changes*, the term *affection* being already otherwise appropriated.

The changes in the sensorium or mental organs, which may excite the consciousness, may be called *sensorial changes*. Of these, some are produced by the impression of external objects on the organs of sense: these may be called *sensible changes*. Others, as we know by their effects, are producible without the presence of external objects: these may be called *ideal changes*, and are the relics of sensible changes. A third class comprehends those which are followed by muscular motion, and may be termed *motory changes*. Sensorial changes of each of these classes may take place without exciting the consciousness, as we shall soon endeavour to shew. When sensible changes are accompanied with consciousness, they are called *sensations*; when ideal changes are accompanied with consciousness, they are called *ideas*: and as sensible and ideal changes are principally important to us when accompanied with consciousness, and it is seldom necessary to distinguish between those which do and those which do not excite it, we shall not usually depart from the

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the customary nomenclature. We have no term appropriated to denote motory changes accompanied with consciousness: this deficiency probably arises from the circumstance, that muscular action is so much an object of the senses, that, by association, it is referred to the moving muscle, and not to the intermediate fibrous motions and sensorial changes. Thus, while writing, all the action seems to be in the fingers, and in the fingers alone, though even the minutest motion, except that which is produced by some external stimulus upon the motory nerve, necessarily supposes motory changes of the sensorium, and should, scientifically speaking, be referred to the sensorium, or mind.

To shew that sensorial changes are not necessarily accompanied with consciousness, we observe, that the diminution of consciousness can be traced in its various stages, from the state of active attention, to cases where we have no reason to believe that consciousness is excited, where yet we have good reason to believe that there were sensible changes, because those effects are produced which we know are produced by sensations, (that is, by sensible changes of which we are conscious,) and, as far as we know, in no instance without sensible changes. The following facts will at least illustrate this position, which we must leave to the reader's close reflection on the procedures of his mind. Persons much accustomed to employ notes in singing, sometimes feel so deeply interested in the thoughts and feelings excited by the words they are singing, that though the notes continue to regulate their tones of voice, the sensible changes are altogether unnoticed by them, they do not excite the consciousness. Again, many who have been long accustomed to perform upon a musical instrument, and are able to play with ease at first sight, can, while playing, even a piece of music which they have not seen before, converse and carry on a train of reasoning, and yet play correctly. The appropriate sensible changes must in such cases be produced; for otherwise the proper motory changes which occasion the motions of the fingers could not; but they are not accompanied with consciousness: as soon as they are, attention to the conversation or train of reasoning is interrupted. In the same manner, persons accustomed to read aloud, can continue to read aloud even what they have never read before, (provided the modes of expression be not peculiar,) with correctness, at least, and at the same time have their thoughts closely engaged on other subjects. The moment their attention is called to what they are reading, their own train of thought is broken. When we are walking along a road, especially if it be familiar to us, our minds may be instantly occupied in reflection or conversation, so that the appearances of the road which direct our motions, shall not, in the slightest degree, excite the notice of the mind. That those appearances do direct us, and, of course, produce sensible changes, though they do not excite the consciousness, is obvious; because if we keep our sight from them, by closing the eyes, by reading, &c. we are continually interrupted by a little trip or jar, unless the road is extremely smooth, or extremely familiar to us. In this last case, either the sensible changes produced by the impressions on the feet, direct the appropriate motory changes and consequent muscular motions; or, one motory change is followed, owing to long association, by its next successive motory change, and so on.

We are fully aware that, in these statements, we shall not meet with the concurrence of those who adopt Mr. Stewart's theory on the subject, in his chapter on Attention; but it is, in opinion, abundantly more consonant with the laws of

the mind, and more borne out by the closest reflection on our mental processes, to suppose that sensorial changes of different kinds may produce each other, without exciting the consciousness, than to imagine, with Mr. Stewart, that when the mind is most deeply engaged upon a train of thought, it may at the same time be continually passing to impressions produced by external objects on the organs of sense, and actually *willing* the motions with which those impressions have been long connected; and all this, confessedly, without our being able, in any degree, to retrace the change of attention, or the act of volition, in those cases where the connection between the external impression and the muscular motion is habitual, and the thoughts closely occupied upon the internal object of attention. It not unfrequently happens that persons, under the influence of very strong excitement of feeling, or deep engagement of thought, pace their chambers with rapid step, utterly unobservant of every external object, and for the time utterly unconscious of every thing but the immediate object of thought and feeling; and yet they never run against the wall, but turn with as much correctness when they ought to turn, as if their attention were particularly directed to the objects around them. Now is it, we would ask, in any way conceivable, that though the entrance of a person into the room, the loud sounds of carriages passing, &c. would in no degree obtain their attention, the customary impressions from the walls, &c. should every moment have a portion of their attention, which must on this supposition be *constantly* fluctuating to them from its immediate object, and all this without leaving the slightest trace in the memory. Innumerable impressions are incessantly produced on the corporeal organs of sensation, (besides those of sight and hearing,) particularly on the organs of feeling, both from the action of external objects, and from the various perceptible motions of the bodily system. These we seldom notice, till some circumstance or other particularly directs our attention to them. The moment this is the case, we have the appropriate sensations; for instance, those produced by the pressure of our feet on the ground, of our arm on the table, of our pen on the fingers, and of our clothes on various parts of the body, or by the muscular motions attending respiration, the beating of the heart, the twinkling of the eye, &c. Now if Mr. Stewart's theory were just, these and every other impression which might, at any one time, produce sensations, and which the mind really observes, when its notice is from any cause directed to them; all these must be every instant attracting its notice with inconceivable rapidity, and in an imperceptible degree, and this even when the mind is so completely absorbed with its own contemplations, that a violent external impression could not divert its attention from them. As soon as Mr. Stewart's hypothesis is thus carried to its just extent, it loses every appearance of rational foundation; and since it cannot be consistently relinquished, (as far as we can perceive,) so long as Dr. Reid's leading principle is retained, the absurd conclusions to which it leads may be regarded as an additional proof that the principle itself is without foundation in the nature of the human mind. The fact appears to us to be, that the external impressions do produce sensible changes, just the same whether the attention of the mind is directed to them or not; that when the attention is fully occupied, if the sensible changes are not sufficiently vivid to interrupt the train of thought, or are not closely connected with other sensorial changes, they produce no farther effect than a tendency to a more easy (if not more impressive) recurrence from similar impressions; that, in short, the mental system is no farther affected by them; but that if other sensorial changes have been habitually

bitually connected with them, these will be produced by them, without the consciousness of the mind being excited to the process. The result may be muscular motion; and in this case, (and sometimes by this only,) we have proof of the operation of the external impression on the mental organs.

If the reader's own experience or observation do not furnish him with satisfactory proof of our position, that sensorial changes may take place, (and if so, very often do take place,) without exciting consciousness, we are disposed to think that the following fact, (stated by Dr. Percival, in his *Moral and Literary Dissertations*, p. 110.) may be relied upon as decisive. "Several years ago, the countess of — fell into an apoplexy about seven o'clock in the morning. Among other stimulating applications, I directed a feather, dipped in hartshorn, to be very frequently introduced into her nostrils. Her ladyship, when in health, was much addicted to the taking of snuff, and the present irritation of the olfactory nerves produced a junction of the fore-finger and thumb of the right hand, the elevation of them to the nose, and the action of snuffing in the nostrils. When the snuffing ceased, the hand and arm dropped down in a torpid state. A fresh application of the stimulus renewed the successive effort; and I was witness to their repetition, till the hartshorn lost its power of irritation, probably by destroying the sensibility of the olfactory nerves. The countess recovered from the fit about six o'clock in the evening; but though it was neither long nor severe, her memory never afterwards furnished the least trace of consciousness during its continuance."

The gradual diminution of the consciousness of external impressions is perceptible on various occasions. If we are observing an extensive prospect, a picture of the whole field of view is formed at once on the retina. We suppose it will generally be admitted, that whenever a visual impression is thus produced, the intermediate organs convey some notice of it to the mental organs. As a matter of fact, it is clear that till the attention is given to some particular parts, we perceive the whole field of view with more or less impressiveness, according as the parts are more or less distinctly and vividly delineated on the retina, and near the axis of vision. By degrees the attention is drawn to some particular object, or part of the prospect; and the consciousness of impressions on the external organ from the other parts is diminished. If the mind is closely engaged in observing that object, it may be, and often is, utterly unconscious of any other: if the attention to it lessens, the other parts are perceived again; in other words, the mind again becomes conscious of the sensible changes produced by the external impressions; and this consciousness is more or less distinct, in proportion to the degree in which the attention is left unengaged by any particular object, and to the circumstances above stated. It requires some skill in the exercise of reflection to observe these, and similar processes of the mind. If the direction of the attention to them is attended with difficulty, the play of the mind is impeded, and the real state of the case is less perceptible. To observe the operations of the mind successfully, we must frequently observe them, till the direction of the attention to them becomes easy; and then we may often detect what is actually taking place, without any material interruption of it. What is wanting is facility and accuracy in observing what passes within us; and when early produced by mental and moral culture, the best foundation is laid for success in the pursuit of mental science. The following may be to many a more familiar case than what we have above adduced. Suppose any one in a room near a water-fall, a forge, or something else pro-

ducing a uniform sound, or sitting near a clock: if every thing besides is quiet, and the mind in that musing state in which its own trains are less impressive than the impressions from external objects, the sound is perceived, and more or less distinctly, according as the attention is directed to it; and it is easy to observe the variations in the degree of the mind's notice of it, from the state of direct attention to that in which one can hardly tell whether it is noticed or not. We often may catch ourselves at the very instant that the consciousness of the sound is vanishing altogether: and that it does so, cannot be out of the experience of every reader. If his watch, at the moment of reading this, happens to be lying on his table, he now begins to hear its beat; and he continues to do so in a greater or less degree, till his attention being again engaged with some other object, the sound loses its impressiveness, and is altogether lost from the view of the mind.

We are aware that the facts in the preceding paragraph, and others similar to them, may to a certain degree be accounted for, by supposing that the mental organs cease to be affected by external impressions, when the attention is given to any other object; that, in fact, the impressions on the retina, for instance, then only affect the ultimate organs of sensation, (*i. e.* produce sensible changes in the sensorium,) when the attention of the mind is not engaged on other objects. But it appears to us much more philosophical to suppose, that the intermediate and mental organs of sensation are always affected in proportion to the degree in which the external organs are; and that the sole cause of their not exciting the notice of the mind is, the greater degree in which it is given to some other object of thought or sensation. We cannot suppose that the mere diminution of attention to other objects, should renew the progress of that change in the organs of sensation which begins in the external organ. It seems unreasonable, in itself considered, to suppose that the attention of the mind to other objects should stop the progress of the change which takes place in the organs of sensation, (beginning at the external organs,) before the mental organs are affected; or that this progress should be renewed by the mere diminution of the attention to those objects. And at any rate, if impressions on the external organs may, without exciting the consciousness, be followed by muscular motion, not originating in the mere external stimulus, (as we see abundant reason to conclude,) then the point may be regarded as proved, that every affection of the external organ of sensation produces a corresponding change in the intermediate and ultimate organs, and that the degree of attention given by the mind to the sensible change, (the change in the sensorium or mental organs,) depends upon the comparative impressiveness of the change, arising from various causes, and particularly affected by the degree in which the attention is engrossed by objects of thought, feeling, or perception, not related to the sensible change.

We have no wish to carry our opinions on this subject beyond the bounds of fact and experience; but we see reason to conclude that ideal changes also may take place without exciting the consciousness. Here the difficulties are greatly increased, because we have no evidence of the existence of any mental changes, of which we are not conscious, except by their causes and consequences. The following case, however, appears to us satisfactory on this point. Every one who can add up a column of figures, knows the nature of the mental operation, because it is learnt after the memory has acquired considerable power. The sum of two or three figures is first ascertained; the ideal change of that sum must, of course, be in the mind; and with that sum is combined

the next figure, and so on. Now, then, there is the act of adding a number, the ideal change of which is in the mind, to another number of which there is a sensible change, and there is the ideal change of the sum, and so on, continually recurring; all this we perceive when we are adding up slowly. But persons who are very familiar with such additions, will tell the result, or final sum, apparently without an effort, apparently without the intervention of the mind, or any consciousness of the operations and ideal changes which must have passed in the mind, before the result could have been obtained. It will not, unfrequently, be found, that persons very much habituated to these operations, can add up much more correctly, while they leave themselves unconscious of the operations and ideal changes, than when they direct the attention in any way to them; and what appears to us to settle the point, as far as consciousness is concerned, the skilful accountant who, by constant exercise, has become familiar with all the possible combinations of small numbers, can go through a series of additions, (and in one instance which we have heard of, a complex series, such as the addition of the columns of pounds, shillings, and pence, at one operation,) and at the same time closely engage the attention upon some other object; for example, can dictate to an amanuensis.

As to motory changes, the fact is so obvious, that muscular actions, which must have had their origin in the mind, (as being regulated by impressions on the external organs of sense,) go on in long succession, and with frequent variation, while, at the same time, the attention is fully occupied by some object of thought, that we are ready to suppose that nothing but its opposition to a pre-formed hypothesis could lead a person to imagine that, in such cases, the muscular action excites the consciousness. Such an immense variety of muscular actions are continually taking place, in cases in which volition was once concerned, without, in any perceivable degree, exciting the notice of the mind, and this is so obvious a fact, and so satisfactorily accounted for by the Hartleyan philosophy, that however plausible the counter considerations of that really eminent philosopher Dugald Stewart (see *Elements*, ch. ii.), we cannot suppose that his hypothesis can gain admission where the operations of the associative power are thoroughly understood.

It seems to us not impossible that the whole of those sensorial changes which are not modified or occasioned by the re-action of the sentient principle, *might* take place without *mind* in the usual philosophical sense of the term. We do not, of course, mean, that there could be *sensations*, or *ideas*, or *voluntary motions* without mind; but that the corresponding sensorial changes (sensible, ideal, or motory,) might, in all other instances, except what we have just excluded, have been produced, and the *mechanism* of the mind, have, in some measure, gone on, without percipiency. And when we consider the wonderful phenomena of life, growth, and re-production, which are brought about by the delicate material structure of plants and animals, we feel no difficulty in allowing, that *thus far* the material part of the human system is sufficient to account for the phenomena, not of *thought*, but of the *immediate occasions* of thought. The immediate *mechanism* of sensation, of ideas, of association, and of motion, we would refer to the sensorium; and we might suppose the sensorium to be material; but there is something beyond this. The sensitive change is not a sensation; the ideal change is not an idea; these imply percipiency and thought; these imply *mind* in the strictest sense; and the percipient principle is the mind itself. The motory change might be produced by its mechanical connection with

different sensitive or ideal changes; but this is not volition; volition is a property of the *mind*.

We excepted the sensorial changes occasioned or modified by the re-action of the percipient principle. As far as sensible changes merely are concerned, the exception is of little consequence; for in *receiving* these, the mind has little to do. Exercise and attention may increase the susceptibility and vigour of the external organs, and the sensible changes may consequently become more lively and vigorous; and the effect of any sensible change upon the mental system will, in a great degree, depend upon the attention which the mind gives to it; but we see no adequate room to doubt, that whenever the external organ is affected, a correspondent change takes place in the sensorium, whether it affect the percipient principle or not, *i. e.* whether or not it become a sensation. The case, however, is different respecting ideal changes, and the associations which take place among them. In the first place, were it not for the attention of the mind to the sensible changes, few of them, comparatively speaking, would be retained; and then none of those associations could be formed, in which the mind, properly so called, has any share, none arising from the perception of various relations, from intentional combinations, from acts of reasoning, volition, &c.; all would be mere mechanism, exquisite and perfect in its nature, yet still nothing but mechanism.

We have sometimes been inclined to consider the sensitive, retentive, and associative powers, "as the elementary powers of the mind, to the operation of which all *intellectual* phenomena may be referred" (see *Intellectual Education*, col. 2.); but farther reflection on the classification of our intellectual phenomena and their mental causes, induces us to extend the number of our intellectual powers. We still see no reason to hesitate in supposing that those elementary powers are sufficient to account for all the phenomena of memory, conception, and fancy; and there cannot be a reasonable doubt that the operations of the associative power have great influence among our other intellectual phenomena; but we fully agree with Mr. Stewart, in the opinion which he has stated in different parts of his works, that it is injurious to the progress of mental science to simplify mental principles too far. We are satisfied that he has not gone far enough; that under the fettering restraints of Reid's principles, he is contented to rest with various extensive classes of our mental phenomena as ultimate facts, where the operations of the associative power afford an explanation equally clear and important; but the student of Hartley should also study the writings of Mr. Stewart; in many, and these the most valuable parts, they are perfectly consistent with Hartleyan principles; where his views are inconsistent with them, we have seldom seen reason to follow him, but there are cases in which he furnishes a salutary check upon the tendencies which the full adoption of those principles can scarcely fail to give the ardent inquiring mind, unrestrained by the caution of experience, and supposing them omnipotent because their inadequacy has not been suggested by opposing systems, or by the actual application of them to the phenomena of thought. If the mentalist is so little able to think and judge for himself, that he must implicitly imbibe his philosophy from another, we should greatly prefer his adopting the system of Hartley to that of the school of Stewart; because the former, though imperfect, and in some degree incorrect, is radically and extensively true, and leads to the most important practical principles for the regulation of the affections and the conduct of life; but where there is the basis of a sound and independent understanding, to study the principles of an anti-Hartleyan,

as Mr. Stewart at last compels us to call him, cannot fail to produce a greater approximation to the truth. As far as phenomena go, those which he has detailed furnish important materials for the Hartleyan to try his own philosophy upon. His reasonings, where they do not involve his first principles, it is impossible to examine without perceiving that they mark a highly cultured and refined understanding, under the guidance of that moral worth which never fails to clear away numerous mists from the mind. Those first principles can scarcely fail to appear to the unbiassed inquirer as inconsistent with human nature as with the Hartleyan doctrines. His invectives and groundless insinuations against Hartley, will serve as an exercise of his disciples' candour. His practical maxims for the conduct of the understanding in the search after truth will often afford a valuable guidance in the processes of philosophical investigation. And his happy talent of illustration, his simple elegance of style, his general perspicuity of reasoning and expression, must excite in the mind of the Hartleyan the passing wish, "would he were one of us!" till he recollects that the interests of truth must eventually be most promoted by having such an opponent.

Having made this digression, we will go on somewhat farther. This article may be read by some who have hitherto paid but little attention to the subject. If they will allow us to give them the direction of some experience, we would recommend, first, the perusal of this article as a kind of outline of the leading features of this most important branch of philosophy. Next, or with it at the respective references, the 5th, 6th, and 7th chapters of Mr. Stewart's Elements. They may then proceed with great advantage to the study of Locke's Essay, and Hartley's Observations, leaving out of the latter, at their first perusal of it, all the parts relating to the hypothesis of vibrations, or taking Dr. Priestley's abridgment. They will then be prepared for the examination of any other works on mental philosophy, to which their own taste, or accidental circumstances, may direct them. In Mr. Bellsham's Elements they will find a very judicious summary of the principal topics of metaphysical inquiry connected with the philosophy of the mind, together with references to the principal writers who have discussed them; and we wish here to mention that there may be some passages in this article, principally, we believe, in the section on the *Classes of Connections*, which we have derived from that work without acknowledgment; to Hartley it is needless specifically to acknowledge our obligations. Besides the works which we have occasionally referred to, with approbation, we must recommend to our readers Tucker's *Light of Nature* pursued. There are few works on abstract science so calculated to call into exercise the powers of investigation, and to sharpen the penetration of the understanding. The author is diffuse, and not unfrequently far from precise in his modes of expression; and it is not always easy to ascertain his drift; but his manner, even in the most abstruse parts, is so lively, his illustrations so numerous and striking, and yet so original and appropriate, and his observations in themselves considered so strongly marked by good sense, that philosophy is obliged to be continually on her guard, to prevent being carried on unawares to conclusions which, in her more sober moments, she must reject. In a variety of instances he has found the truth; and where he is less successful, he schools his reader to activity, acuteness, and vigour of thought. Paley, in the Preface to his *Moral Philosophy*, expresses his great obligations to him; and it is not too much to say, that that eminently useful writer owed a great deal, not only of his matter, but of the most attractive part of his manner, to him. In preparing this

article, the writer of it has not been able to avail himself much of this *Light of Nature* pursued; but he wishes to acknowledge his obligations to that work for an important distinction in the acceptations of the term *mind*, which he had for some time been verging to, but had not reached, till he met with it there. Will the reader excuse his stating the procedure of his mind on the subject? About six or seven years ago, he was engaged in some mental investigations, which led him to attend to the fact that operations which would be universally considered as belonging to the mind, might go on without exciting the consciousness. It admitted of an easy explanation upon the hypothesis of vibrations; but he wished to found no opinion on that hypothesis. He had occasion to state the fact under different aspects; but could find no words but *sensations* and *ideas*; and to speak of these as existing without consciousness, appeared a contradiction in terms. In the unguarded use of both by Priestley, Tucker, &c. and of the latter in one or two instances by Hartley, he had some justification; but he perceived it was inadequate. Regarding consciousness as the essential principle of mind, he felt great perplexity on the subject of these operations which he could not but believe to be justly referred to the mind. In examining Tucker for justification of an extended application of the terms *ideas* and *sensations*, he met with a distinction between the popular and philosophic acceptation of the term *mind*, which gave a satisfactory modification to the results of his own investigations. (See *Light of Nature*, ch. vii.) The appropriate term *mental organs* founded on this distinction he has also taken from Tucker, without going so far as that writer does in determining their nature.

If, in using the terms *sensorium* or *mental organs*, we should be supposed, by any reader, to involve any unfounded hypothesis, we have only to observe, that we adopt them solely to give some degree of precision to our notions on the subject; and that he may leave them out, if he will allow us to use the term *mind* in its looser acceptation, and say that sensible changes are those changes in the mind which, when they have the notice of the percipient principle, are termed *sensations*, and so on in the other cases. We cannot allow that this phraseology involves any *hypothesis*; but is founded on an extraordinary, but in our apprehension well ascertained, fact, in our mental constitution.

We were going, several paragraphs back, to observe that the characteristic phenomena of judgment, reasoning, and reflection, do not appear to us capable of explanation by the laws of sensation, retention, and association; and these classes of mental operations closely connected, and in some cases perhaps not distinguishable, we would arrange under the general head of *Understanding*, which, much as Hartley does, we would define the faculty of the human mind by which we contemplate sensations and ideas, considered as such, and the various operations of the mind, discern the relations which exist among the objects of perception and thought, pursue truth, and assent to, or dissent from, propositions.

With the views which we have stated in this 1st division of the present article, we shall, in the subsequent divisions, consider the leading faculties of the mind in the following order.

- II. *Sensitive Power.*
- III. *Retentive Power.*
- IV. *Associative Power.*
- V. *Motive Power.*
- VI. *Memory.*
- VII. *Imagination.*
- VIII. *Understanding.*

I. *Of the Sensitive Power.*—The brain is a soft pulpy mass, of a whitish colour on the inside, occupying all the cavity of the skull. Minute differences are observable in the substance of the brain, in different parts of it; but it is unnecessary to enter upon a statement of them here. (See BRAIN, and its dependent articles.) The spinal marrow is the continuation of the lowest part of the brain, which passes through the great opening of the skull down the hollow of the back bone. From the brain and spinal marrow proceed the nerves, which at first are fine fibres of the same substance with the brain; these fibres meet, and form soft white pulpy cords, which afterwards spread themselves over various parts of the body, by splitting into innumerable and exceedingly minute branches. Anatomists count forty pair of nerves (for they come off in pairs though they afterwards separate); of which nine or ten only come from the brain at the bottom of the skull, and the rest from the spinal marrow. Those from the brain are distributed to various parts of the head; those from the spinal marrow are distributed over the trunk and extremities. See NERVES.

The external organs of sense, the nerves, and the brain, in which, for brevity, we include the whole medullary substance, are the corporeal organs of sensation. All, as we are at present constituted, are necessary to sensation. If the external organ is destroyed, no sensation can be produced; where there are no nerves, there is no sensation; where the nervous branches are most numerous, there is most sensation; if the nerve be destroyed, sensation cannot be produced from those parts to which the nerve belongs, which are farther from the brain than the injured parts. The brain is the ultimate organ of sensation of which we have any knowledge. All the nerves terminate in the brain. If the brain is compressed, sensation is suspended. If the brain is considerably injured, sensation ceases.

There is, in like manner, considerable reason to suppose that the brain may be the immediate organ of ideas. If the brain is diseased, many of the phenomena of thought are altogether changed. If the brain is compressed, thought is suspended. If the brain is materially injured, ideas cease.

So also the brain appears to be the primary organ of all motions which are not produced by the immediate action of external objects upon the muscles. The muscles are the immediate organs of motion. (See MUSCLE.) The muscles consist of fleshy substances, and generally also of tendon. The tendons fasten the muscles to the bones; and the fleshy parts, by their contractions, produce the motions of the bones. Into the fleshy parts of the muscles, numerous nerves enter; they are diffused over their surface, and within their substance. These nerves, as before-mentioned, terminate in the brain; they are the intermediate organs of voluntary motion between it and the muscles. If a nerve be compressed or punctured, motion is produced in the muscle over which that nerve is distributed. If a portion of that nerve be cut, or otherwise destroyed, voluntary motion can no longer be produced in that muscle over which it was distributed. If the brain be touched with any instrument, or caustic be applied to it, the muscular system undergoes the most violent contortions. If the spinal marrow be compressed, the power of voluntary motion is suspended in those muscles which receive their nerves from the back. If the brain is considerably injured, all power of voluntary motion ceases.

Some of our readers may hope that we are now going to give some hypothesis on the nature of those changes in the corporeal organs which occasion or accompany sensation, idea, and voluntary motion. We have, however, none to give. If our object were different, we should lay before

them Hartley's hypothesis of vibrations, with the arguments for and against it; but we cannot convince ourselves that it has any thing to do with mental philosophy. All that appears to us important, in the present state of our knowledge respecting the connection between the mind and the body, we have already stated: no hypothesis as to the physical occasions of thought can, yet, really explain the operations of thought. If there must be some hypothesis, connected with the doctrine of association, we recommend the reader to assume Hartley's hypothesis, employing the term *vibrations* merely to denote the changes, whatever they be, in the ultimate material organs of the mind, which occasion or accompany the various exercises of the percipient principle. We do not think he will gain much by it; but it will do less harm than by defining the nature of those changes. On the hypothesis of vibrations, the reader may consult Reid and Belsbam. The latter has given a luminous statement of the arguments for and against it. We learn from Dr. Aikin's General Biography (Hartley), that Haller maintains that it is totally incompatible with the nature of the nerves and medullary substance. (See Haller's *Elementa Physiologiæ*, vol. iv. sect. 8. art. Conjecturæ, § 4.) Respecting the part of the brain most intimately connected with the mental functions, several curious facts are stated in a paper by M. de la Peyronnie, subjoined to Jurain's French translation of Hartley's first volume, (1755,) taken from the Memoirs of the French Academy of Sciences. The opinion of that author, founded on his facts, is, that the *corpus callosum* is the seat of the soul. We have no opportunity of knowing what Dr. Ferriar may have urged against this opinion in the Manchester Transactions.

The *external Organs of Sensation* are usually classed under five heads, sight, hearing, feeling or touch, smell, and taste. The sense of feeling might probably be divided, with convenience, into two or three; because the classes of sensations which are referred to this sense differ considerably in themselves, and in the external causes producing them. But the common arrangement is sufficient for our purpose.

The present article, and the next following, have unexpectedly been assigned to the writer of those on Education. If he had foreseen this circumstance, he would have made references to this article from *INTELLECTUAL* and *MORAL Education*. As it is, he has, in several parts of those articles, introduced observations which would otherwise have had place here; and though it would be easy to relate them with considerable amplification, yet his limits being necessarily confined, he prefers referring to those articles, for such observations as may be necessary for his present purpose.

To perceive the influence of each sense in forming our notions and feelings, it is necessary carefully to distinguish between the mere sensation, and those ideas which are, by association, so connected with it, as to appear at first view a part of the sensation. When the sensation, produced by an external object, is so closely united with ideas derived from other senses, or from the same sense in different circumstances, that the whole shall appear to be one feeling, apparently derived immediately from the external impression, the whole together, the sensation and associated complex idea, is called a *perception*. For farther illustration, see *INTELLECTUAL Education*, chap. ii. col. 3, 4. The change of sensations into perceptions, furnishes some very important instances of the operation of the associative power; and without an acquaintance with the influence of association in making sensations at once bring complex ideas into the view of the mind, it is impossible to understand the real nature of perception. It clearly was not understood by Dr. Reid; nor

nor indeed was it possible for him to enter into the distinction between sensation and perception, without calling in the agency of association; and as we have already hinted, he could not receive the doctrine of association, when his fundamental position rendered the existence of this principle impossible. By long exercise, the operations of perception become so intimately united with sensations, that, in numerous cases, the sensation is with great difficulty distinguished from the associated idea; and it is not to us at all surprising, that a man of such cool and steady character of mind, should not have been able to discriminate between the sensation and, in his case, the *unvarying* associated ideas, since he had not acquired an insight into the formation of ideas by association, and had even brought himself to deny the existence of any *objects* of our mental operations separate from the external objects of sensation. He saw that the Berkleyan hypothesis was contradicted by the obvious dictates of common sense, and being unaided by the principles of association, he had no resource but to make the sensation introduce the belief of an external cause of it, by instinct, or a kind of inspiration.

1. *Sense of Feeling.*—When the mind has connected the complex ideas derived from the touch, with the visible appearance of objects, the sight is then indefinitely the most useful channel of knowledge respecting external objects; but in the earliest stages of the intellectual progress, the touch is the most useful; in fact, as man is formed, it is then absolutely necessary to render the sight productive of most of its present utility. The sense of feeling differs from the other senses, in belonging to every part of the body, external or internal, to which nerves are distributed. The term *touch* is most correctly limited to the sensibility which is diffused over the surface of the body. The touch exists with the most exquisite degree of sensibility, at the extremities of the hands and in the lips. The sense of touch is thus very commodiously disposed, for the purpose of encompassing smaller bodies, and for adapting itself to the inequalities of larger ones.

The sensations acquired by the sense of feeling, are those of heat, hardness, solidity, roughness, dryness, motion, distance, figure, &c.; and all those corporeal feelings which arise from a healthy or diseased state of the nerves, and of the part of the body to which they belong.

The pains of this sense are more numerous and vivid than those derived from any other sense; and therefore the relics of them associating and coalescing with one another, constitute the greatest share of our mental pains. On the other hand, its pleasures being, in general, faint and rare, in comparison with others, and particularly those of the taste, have but a small share among the rudiments of the mental pleasures. The sexual feelings of a corporeal nature, however, when under due regulation, do undoubtedly contribute, in more advanced periods, to the composition of some refined mental feelings; and for some very important remarks respecting the origin and influence of these desires, we beg to refer to Hartley's 73d proposition.

The touch is the original medium of our knowledge respecting the real qualities of substances, and indeed is the sole medium by which we gain a knowledge of external objects as such. It is by the touch, and originally by the touch alone, aided by the power of muscular motion, that we distinguish our own bodies from other objects that surround us, and from the impression which every one has, that the objects which affect the sight, the hearing, &c. are external. When we touch a sensible part of our bodies, we have sensations conveyed to the mind through two nervous branches; when we touch any other body, we have

only one sensation. For some interesting and often satisfactory speculations as to the influence of different senses in forming our ideas respecting external objects, see Condillac's *Traité des Sensations*. Mr. Stewart appears to have been led by that work to some remarks at the close of his chapter on Perception; and we do not hesitate in saying, that those remarks entirely overthrow the fundamental principle of Dr. Reid's theory of perception, by which he imagined he had demolished the visionary hypothesis of Berkeley. See PERCEPTION.

The notion that external objects give us the sensations of sound, taste, sight, and smell, is so continually forced upon us by the sensations of touch, aided by the power of muscular motion, that there probably was never found a person who doubted of the existence of the external world as the cause of his sensations, except from the influence of philosophical speculation. Some very acute thinkers have, indeed, given up the belief of an external world as the cause of their sensations; but their opinion never did, nor never can, gain much ground; for it is inconsistent with the perceptions, which, by the constitution of our frame, are necessarily formed from continually recurring sensations. The philosophic Berkeley, and a late writer, Mr. Drummond, are the chief supporters of this curious, but to say the least, unimportant opinion. If it were allowable to leave every thing out of consideration, but the occasional vividness of our visual conceptions, and the indisputable fact that sensations are merely affections of the mind, it might be very difficult to resist the acuteness of their reasonings; but we are fully satisfied, that they would never have come to their curious conclusions, if their object had been to investigate the sources of that belief which we doubt not they had themselves, except in the moments of abstract speculation; and if they had paid more attention to the influence of the sense of feeling (aided, of course, by muscular motion) in the formation of our perceptions. They would then have regarded it as infinitely more probable that this almost irresistible conviction is a well-grounded one, than that every human being is almost every moment of his life labouring under a delusion by the very constitution of his nature, for which no supposable end can be assigned, and which must therefore be inconsistent with the known attributes of the Supreme Being.

Some philosophers have supposed, that it is owing to the exquisite delicacy of feeling which exists in the hand, together with the exquisite mechanism by which it is applied, that man possesses such superiority in knowledge over the lower classes of animals. It cannot be just to attribute to this cause alone his mental superiority: but, indisputably, as man is constituted, it is essential to the degree of superiority now possessed; and we observe, that tribe of animals possesses the greatest degree of what may be called human wisdom, which has the sense of touch most perfect; the flexible organ at the end of the elephant's trunk answering some of the purposes of the human fingers. See INTEGUMENTS.

2. *Sense of Taste.*—This sense, and that of smell, are nearly allied to the sense of feeling. They are, however, properly distinguished from it, because they have each a peculiar organ, and are each affected by peculiar properties of bodies. The chief organ of taste is the tongue; and it is fitted for its office, by the numerous extremities of nerves which are lodged along its surface, and particularly at the top and sides. Hartley considers this sense as extending to the other parts of the mouth, and through the throat, and the other parts of the alimentary duct. Taken in this comprehensive acceptation, the sense of taste con-

veys to the mind sensations not only of flavours, but of hunger and thirst.

In order to produce those sensations of taste which are derived from the tongue, its nervous extremities must be moistened; and the action of eating generally produces the effusion of a fluid from different parts of the mouth, which answers the purpose of exciting the taste and assisting the digestion.

The taste undergoes some remarkable changes in passing from infancy to old age. Sweets generally grow less and less agreeable, and sometimes even disagreeable, and at last nauseous. Astringent, acid, and spirituous liquors, which displease at first, afterwards become highly grateful. Even bitter and acrid substances first lose their offensive qualities, and after a sufficient repetition give a relish to our aliment. And many particular articles of food or medicine, become either extremely pleasant or disgusting, from associations with fashion, joy, hope of advantage, hunger, the pleasures of cheerful conversation, &c. or with sickness, vomitings, gripings, fear, sorrow, &c. These changes are partly in consequence of the usual effect of custom on the organs of sensation, both external and internal, *viz.* to diminish the vividness of sensation; and partly owing to the influence of association. This operates, Hartley thinks, principally in the following method. The pleasant and painful impressions which particular foods and medicines make upon the stomach, always either accompany the taste, or follow it in a short time; and by this means an association is formed, whereby the direct pleasantness or nauseousness of the taste is enhanced, if the impressions upon the tongue and stomach be of the same kind, or diminished, and perhaps overpowered, and even converted into its opposite, if they be of different kinds. In like manner, a disagreeable taste, by being often mixed with a pleasant one, may at last become pleasant alone, and *vice versa*: hunger and satiety may also, by being joined with particular tastes, contribute greatly to augment or abate their relish. It may also be observed here, that the desire of particular foods or liquors, is often directly excited by their associated circumstances, and this, in some cases, more than by their tastes, or even when their tastes are nearly, if not altogether, become indifferent; and it is very common for these circumstances, particularly the sight or smell of the food or liquor, to prevail against men's better judgments, directing them to forbear, and warning them of the mischiefs likely to arise from self-indulgence.

The pleasures derived from taste are very considerable; and the power of yielding pleasurable sensations usually accompanies the taste through the whole of life. Hence it is reasonable to infer, that its pleasures constitute one grand source of the mental pleasures, that is, of those which can be felt without the direct intervention of sensation. They leave their relics in the mind; and these combine together, with other relics of pleasurable sensations, and they form feelings which often connect themselves with objects which have no immediate connection with the objects of taste. To this source Hartley traces the principal origin of the social pleasures; and there cannot be a doubt, that the pleasures of taste are the chief original source of the filial affections. (See *MORAL Education*, col. 22, 23.) It appears that one end of the long continuance of the pleasures of taste, is to supply continual accessions to the mental pleasures; but, without a doubt, the principal object is to make that a source of pleasure which is necessary to self-preservation. The pains of taste are much less numerous than those of feeling. They are only such as are necessary to prompt to avoid

excessive abstinence or gratification, and to prevent the employment of improper food. "The most common of these painful impressions is that from excess, and the consequent indigestion. This excites and supports those uneasy states, which attend upon melancholy, fear, and sorrow."

3. *Sense of Smell.*—This sense is very nearly allied to that of taste; and indeed many of those pleasurable sensations which are usually referred to the taste, (as being received during the act of eating and swallowing,) really belong to the smell. The external organ of smell is a membrane or skin, overspread with nerves, which line the internal cavity of the nostrils, and the surface and cavities of the bones which join the nostrils. This is affected both by the odorous particles which proceed from external substances through the nose, and by those which come from the substances which are eaten; for there is a communication between the nose and the back part of the mouth.

The pains of smell are obviously designed to assist us in the proper choice of food; and also to prompt us to avoid such noxious vapours, as may render the air injurious to health and life. It appears also, that offensive odours, in various circumstances, contribute to generate the sense of shame, decency, &c. The pleasures of smell have a direct connection with those of taste: it is only necessary, therefore, to add to what has been said respecting the latter, that the pleasures of smell which arise from the various productions of nature, have a considerable share in the formation and vividness of some of our mental pleasures; and, in particular, of those which arise from the view of rural objects and scenes, and from the representations of them by poetry and painting.

4. *Sense of Sight.*—The organ of sight is a globular body, which contains within it transparent substances fitted to form on the back part of it, a picture of the object of sight. The examination of an ox's eye will give a pretty accurate idea of the general structure of the human eye. We see in front a horny transparent substance, called *cornea*. Next to this is a watery fluid, called *aqueous humour*, in which the *iris* floats like a delicate curtain, with an aperture in the middle, called the *pupil*. Behind the iris we find a solid body, with two surfaces of different convexities, called the *crystalline lens*. Next to this is the *vitreous humour*, a jelly-like transparent substance, which fills the ball of the eye. The *retina* consists of exceedingly minute fibres from the optic nerve, which are spread over the whole of the back part of the inner surface of the eye. Behind the retina is a mucous substance, which in the human eye is of a dark colour, and serves to imbibe the rays of light which pass through the retina, so as to prevent the confusion which would arise from the reflection of them. The retina is the immediate organ of sight. The rays of light proceeding from every visible point of the object of sight, enter the eye through the cornea, and pass through the pupil: they are refracted by the three humours of the eye, so as to form upon the retina an exquisitely beautiful and distinct, though minute, picture of the object. A tolerable idea of the formation of the picture may be obtained, by carefully cutting off the back coating of an ox's eye, and holding behind it a piece of paper to receive the picture of some luminous object. For a minute account of the structure of this organ, see *EYE*.

What effect is produced upon the optic nerve by the formation of this picture upon the retina, is not certainly known: it is sufficient for our present purpose, that, by means of the nerve, &c. the impression, of whatever nature it be, is communicated to the mental organs, and produces

in them those effects, which, when they excite the consciousness, are called sensations.

The picture on the retina is inverted; and yet it does not appear that the visual sensation conveys the notion of the object being inverted, even when unaided by the ideas derived from the touch. The first efforts of children to grasp, &c. afford no indication that the object appears to them inverted; and we are not aware that the rectification of this visual impression is among the lessons which the blind have to learn when they have been restored to sight. When the kitten playing before the mirror sees her own image, and strikes her paw against it, (before she is wise enough to try, like Lee Boo, to look behind it,) she aims as if she perceived the image in the direct position: her image appears at the bottom of the glass, and, we will suppose, on the right side of it; and there she strikes; though in the picture on the retina it appears at the top, on the left. The efficacy of association to correct the influence of the inverted picture, by the ideas derived from the touch, we could in no way doubt; but, notwithstanding the statements of some optical and metaphysical writers, we are satisfied that the mind does not see objects inverted, though the impression upon the retina, if the immediate object of the mind, must, of itself, produce this notion. The nervous fibres of which the retina is composed, may change their relative position before they reach the brain; or the mental organs of touch and those of sight may have such a relation, (of situation, if corporeal,) that the sensations of position in this respect shall correspond. Whatever may be the real cause, however, the fact clearly is, that the inverted picture on the retina does not produce a sensation of the object as inverted; and that by the visual impressions alone, the erect object is perceived as erect. The landscape or portrait painter can, by long habit, separate the visual sensation from the perception, and see the objects of sight as they would appear on a uniform surface; but we never heard that he was able to see them inverted, which he must sometimes do, in the course of his abstract attention to the visual sensation, if, as appears to be commonly thought, the visual impression of itself, separate from the ideas derived from the touch, conveyed to the mind the notion of objects as being in an inverted position. Even the profound Hartley has passed over this circumstance without adequate consideration.

If the sensation produced by the object of sight be considered unblended with the relics of other sensations, we find that it is merely what can be communicated by a minute picture on the retina. The sensation of colour can be thus communicated, and this is the only sensation which can be considered as appropriate to the sight. The sensation of figure can be communicated, but only of figure in two directions, length and breadth; for the picture on the retina can have only those two dimensions. The sensation of magnitude can also be thus communicated, but not of real magnitude; for a sensation of real magnitude cannot be conveyed by a picture which is almost indefinitely smaller than the real object. To use the illustration of Adam Smith: "If you shut one eye, and hold immediately before the other a small circle of plain glass, of not more than half an inch in diameter, you may see through that circle the most extensive prospects, lawns, and woods, and arms of the sea, and distant mountains. You are apt to imagine that the visible picture, which you thus see, is immensely great and extensive; but it can be no greater than the visible circle through which you see it. If, while you are looking through the circle, you could conceive a fairy hand and a fairy pencil to come between your eye and the glass, that pencil might delineate upon that little glass, the outline of all those extensive lawns, and woods,

and arms of the sea, and distant mountains, in the dimensions in which they are seen by the eye." Again, it is obvious, that however large or however small the field of view, the picture occupies an equal extent upon the retina. Similar observations might be made with respect to distance. The organ of sight can convey only that sensation of distance which may be produced by a minute picture on the retina; that is, nothing but the sensation of the distances of the different parts of the picture, which may bear no proportion to the real distances, and can only be in two directions. Similar things may be said of motion, that is, change of position. The visual sensation of motion is merely that produced by the motion of different parts of the picture on the retina.

The fact is, that not the objects themselves, but the picture formed upon the retina, is the immediate object of the sight. Without the sense of touch it is probable that the picture would never have conveyed ideas of real figure, magnitude, motion, or position; still more, that it would never have conveyed the idea, that external objects produced the picture. Of colour it does convey sensations which do not receive correction from the touch, and which, can be acquired by the sight alone. Persons completely blind have been known to distinguish objects of one colour from those of another, but this is by the feel of the surfaces of those objects. If they have never at all possessed sight, though they may speak of colours, and distinguish coloured objects, and even have a remote idea of the causes of our sensations of colours, yet they can have no sensations, nor consequently ideas of colours. Mr. Locke mentions a blind man, who said, that he imagined the colour of scarlet resembled the sound of a trumpet.

The limits here stated of the direct power of the sense of sight, may appear strange to those who have not been accustomed to distinguish between the sensation, and the perception of which the sensation forms a part. We seem to have an immediate sensation, by means of the sight, of the real situation and magnitudes, &c. of objects; but what has been before stated is an indisputable fact. The ease, is the compound ideas formed from the sensations of touch, in connection with certain visual sensations, are so early formed, and so early connected with those visual sensations, that we have no recollection of the simple ideas of sensation, or of the formation of the compound ideas: indeed, as active agents, we have no concern in the formation of our perceptions. There are, however, numerous circumstances which prove the point; the most satisfactory are those attending the obtaining of the sight, at a period when recollection can register the sensations. One such case fell under the observation of the able Chefelden, and we shall state some of the principal circumstances of it. Mr. Chefelden couched a youth of thirteen years of age. When he was allowed to use his sight, all objects appeared to him alike to touch his eyes, as the things which he felt touched his skin. He considered solid bodies as planes differently coloured; and when he had learned to distinguish solids by their appearances, he was greatly surprised, when examining the pictures of solids, to find all the parts plane and smooth like the rest; he asked which of his senses deceived him, his sight or his feeling? Being shewn a miniature of his father, which was painted on a watch case, he at once perceived that it was a representation of his father, but expressed great surprise that so large a countenance could be contained in so small a space, it appeared to him as impossible as for a pint to contain a hog's head. Mr. Ware published, in the Philosophical Transactions of 1800, a case which seemed to militate greatly against Mr. Chefelden's conclusions: Mr. Ware's patient from the first had

had ideas of distance and form. But Mr. Ware himself furnishes a solution of this difficulty; for we find, from his paper, that his patient had always been able to distinguish light and vivid colours from shade.

Sensations of colours are, in the early parts of life, very vivid, and assist considerably in the formation of our mental pleasures; but the other sensations derived from this sense are principally important to us, as being by association the signs of the ideas derived from the touch; and, from their distinctness, well calculated to serve as the connecting bond of union, and to bring those ideas again into the view of the mind. The visual sensations, of themselves considered, are seldom the objects of reflection; we seldom even think of them; and while we appear to give to the visible appearances of objects our minutest attention, we are, in fact, attending only to the tangible qualities of which the visible appearance is the sign. Were it not, therefore, for association, the sight would be of little more use to us than a beautiful picture of objects with which we have no concern. But consider its value in connection with association; and it must be regarded as the most perfect and the most permanently valuable of all the senses. The information obtained by the touch is acquired slowly; and the sensations must be continually repeated, in order to acquire information respecting new objects; but the sight takes in a vast variety of objects, and, almost at a glance, can distinguish most that is necessary to be known respecting them. Its sensations recall the past impressions derived from the touch; and at once suggest the size, the shape, the distance, of their various objects. "If a man," says Reid, "were by feeling to find out the figure of the peak of Teneriffe, or even of St. Peter's at Rome, it would be the work of a life time." Besides, its discovery reaches farther than the touch could carry us; it enables us to range through the vault of heaven, and determine the motions of the heavenly luminaries. It traces in the countenance the workings of the mind; it displays the passions and affections of the soul. With association it is every thing. Without it, it would be useless as the bright fleeting visions of sleep.

5. *Sense of Hearing.*—The sense of sight is affected by rays of light proceeding from the different objects to the retina. The sense of feeling is affected by the contact of its various objects with the body, or by the vigorous or unsound state of the parts of the body. The sense of taste is affected by certain particles of substances which are dissolved by the saliva, and thus brought into contact with the organs of taste. The sense of smell is affected by particles which various substances are continually sending into the air, and which impress the membrane which lines the cavity and bones of the nose. The sense of hearing is affected by the pulsations or vibrations of the air, which are caused by its own expansion, or by the vibrations of sounding bodies. These pulsations, or vibrations in the air, are called sounds, as are also the sensations which they produce. The organ of hearing is much more complicated, and much less understood, than that of sight. We shall here give a very general account of it, and refer those who wish for further information to the article *EAR*. The external ear collects and modifies sounds; and by a long channel communicates them to the internal ear. This consists, in the first place, of what is called the drum of the ear, which is a small cavity, closed towards the opening of the ear by a delicate membrane. In the drum are three or four very small bones, furnished with muscles and joints. From the drum are several openings, one of which is to the mouth; the others communicate into different recesses of the ear. One of these leads into the labyrinth,

which consists, first, of a small irregular cavity, next of three semicircular canals, and lastly, of a winding spiral canal, not unlike some sea-shells. All these parts of the cavity are lined with a very delicate membrane, and filled with a watery fluid, which conveys to the portions of the nerve in contact with it, the vibrations received from the membrane which separates the labyrinth from the drum of the ear. The vibrations of the air act upon the drum, and thus set in motion the series of small bones in the cavity of the drum: these communicate the vibrations to the membrane which separates the drum from the labyrinth; and this, as before-mentioned, produces vibrations in the watery fluid, in the several parts of the labyrinth, and conveys to the nervous branches, which line the labyrinth, the vibrations originally produced on the drum. The mechanism is complicated, but what we understand must increase our reverential admiration of the skill which produced it.

There are colours which of themselves, without associated ideas, are agreeable to the sight; and it is reasonable to believe that there are sounds which of themselves, without associated ideas, are agreeable to the ear. This is authorized also by direct experience. All moderate and tolerably uniform sounds please young children; and during the whole life, various combined and simple sounds give pleasure to the mind without any reference to the associated ideas. Hence it appears that the pleasures of hearing aid considerably in the formation; or at least in the increase of the mental pleasures: indeed, in connection with those of sight they constitute nearly the whole of the pleasures of sublimity and beauty.

It is a well known fact, that the ideas left by the sensations of sight are the most vivid and distinct of any: next to these are those produced by the sensation of hearing. Few can form a distinct, certainly not a vivid, conception of the feel of any substance which has presented sensations through the medium of the touch, and not many more can of a taste, or of a smell, though thinking of particular taste produces considerable effusion of the saliva. Of objects of the sight we are able to form conceptions, which often approach in vividness and distinctness to the original sensations, and which sometimes overpower those actually present in the mind, so as in many cases to lead to the belief of a real object, and consequently to lead to the belief of apparitions, &c. Few, we believe, possess the power of forming conceptions of sounds nearly equal in vividness and distinctness with the original sensation; but they are frequently perceptible. After we have heard music, or conversed much with a person, trains of audible ideas frequently pass in the mind. So, when we are thinking or reading slowly and carefully, we can generally trace the relics of the audible impressions of the words suggested by the thoughts or the sight of the letters; that is, we have faint conceptions of the sounds of these words.

The necessity of hearing to man, considered as a social being, is obvious; its importance to him, considered as a being whose pleasures and pains are by degrees to be purely mental, is not inferior. The means of knowledge are greatly diminished by the loss of sight, but the loss of sight only impedes the progress of the mind from sensation to thought and feeling. Those who have never heard have much greater disadvantages to undergo. Their deficiencies can never be fully supplied. Words, as Hartley suggests, are highly important, and even necessary to the full improvement of intellect, and the enlargement of the affections; and, therefore, the ear is of much more importance to us, as spiritual beings, than the eye.

*General Observations respecting the Sensitive Power.*—We shall

shall conclude this division of our article with a few general remarks on sensation, on most of which we shall not enlarge, as we have already anticipated them in *INTELLECTUAL and MORAL Education*.

1. Sensations are the rudiments or elements of all our ideas, that is, of all our thoughts and feelings, excepting the ideas of consciousness. See *INTELLECTUAL Education*, col. 2.

2. Considering man as an intellectual being, the correctness and extent of his perceptions are of the first moment: these are, in fact, the materials of all knowledge respecting external objects; and in the early stages of mental culture are the only objects of the understanding. See *INTELLECTUAL Education*, col. 3, and also col. 4, 5.

3. Sensations are to be considered not only as the original materials for the various operations of intellect, but as the sources of all the mental pleasures and pains. See *MORAL Education*, col. 21.

4. Considering man as a being of feeling and affection, it is requisite, during the early part of life, to keep the inlets of sensations in a fit state for receiving them, and not to check the pleasures of sensation, or to impose its pains, except where an enlightened regard to the welfare of the individual requires it. See *MORAL Education*, col. 22.

5. The grand law of sensible pleasures and pains is, that by frequent repetition they lose their vividness. This is a law to which may be traced various important facts connected with the moral culture. (See *MORAL Education*, col. 51. *On the Conscience*, § 11.) Whatever be the peculiar mode by which impressions from the objects of sense are transmitted through the nerves to the brain, it appears decidedly probable, that the difference between pleasurable and painful sensations consists, as far as respects the sensations themselves, in degree only: that pain has the same cause as pleasure, except that it acts more intensely. "All pleasure," as Hartley remarks, "appears to pass into pain by increasing its cause, impression, duration, sensibility of the organ, upon which it is impressed, &c.: thus an agreeable warmth may be made to pass into a troublesome or burning heat, by increase or continuance; and the same thing holds, with respect to friction, light, and sound." Hence, since repetition diminishes the vividness of the sensation, (provided there be no increase in the exciting cause, or in the sensibility of the organ, &c.) great pain will, by repetition, gradually subside into pain less intense; pains may be converted by repetition into pleasures; and pleasures may be converted into indifferent sensations. This progress may be observed in the effects of spirituous liquors, or any other stimuli which strongly affect the organs of taste. There is, probably, no case in which the taste of spirituous liquors would originally be otherwise than disagreeable. By degrees the repeated use of them bring the sensations which they occasion within the limit of pleasure. Even then a considerable increase of the quantity taken would heighten the sensations to the limit of pain: but suppose the pleasurable portion continued without increase, the repeated use of it diminishes the vividness of the pleasure, till at last the sensation produced is completely indifferent. We here adduce the fact merely as illustrative of the general principle.

6. We have already stated, that the original sensible pleasures derived from the taste and smell are very numerous, and far exceed the pains: that the original sensible pleasures derived from the sight and the hearing are also numerous, while the original sensible pains are few: and that the original sensible pleasures derived from the sense of feeling are less intense than the pains derived from that sense, which

are more numerous and vivid than all the other sensible pains united. From this account we should be led to infer, that the pains of sensation are very far exceeded by the pleasures of sensation. This will be still more evident when we recollect that the pleasurable sensations are those of constant occurrence; the painful sensations much more rare. In the early part of life, most sensations that are not painful are pleasurable; and the pleasurable ones are continually recurring. The eye and the ear seem to convey scarcely any thing but pleasurable sensations to the infant mind: the taste and smell are continually pouring in their pleasures, seldom mixed with pain: the feeling, when the body is healthy, "when life is felt in every limb," is also continually adding to the stock of pleasurable sensations those derived from the glow of health, and the active motions of childhood. To balance all this, there are, in some few cases, frequent pains of body; but more frequently the pains arising from ill health are of rare recurrence, and the artificial sensible pains are still less frequently received. Such is the matter of fact: and if we consider the cause of the pleasures and pains of sensation as differing only in degree, we shall readily admit, that, on the whole, the pleasures far exceed the pains: for the sensible pains being produced by an excessive action of the organs of sensation, common impressions will not produce them; and should they become very frequent, they will, agreeably to the grand law of sensation already stated, gradually diminish in vividness, and at last come within the limit of pleasure.

III. *Of the Retentive Power.*—Whatever be the effect produced on the mental organs by the impressions on the organs of sense, that effect can be renewed, though in general with diminished vigour, without a repetition of the sensible impressions. In other words, sensible changes produce a tendency to similar changes, which can be repeated without the repetition of the external impressions, and may thus be called *ideal changes*. Less generally, sensations leave relics behind them, which can be perceived without the agency of the external organs of sensation, and which are called *ideas*. The power or capacity of the mind, by which tendencies to ideal changes are retained, may be called the *retentive power*.

That tendencies to a repetition of sensorial changes are thus formed, that ideas are thus retained, might be referred to the operation of the sensitive power, and in the human being they certainly depend upon the same organic causes, whatever those be. But in many animals it is decidedly probable, that sensations leave no relics behind them: and in man there are, with equal probability, numerous impressions from external objects which leave no relics behind them; though we feel constrained to add from constant experience, that in many instances, where sensations have left no ideas sufficiently determinate to be recalled by voluntary recollection, or presented again to the mind by association, a recurrence of the sensations afford decided proof that they have left relics behind them, for we at once perceive that we have experienced them before. This we apprehend, however, is only where the sensible changes have in the first instance obtained some degree of attention. We are not aware of any satisfactory proof that they leave any relics behind them where they have not excited the consciousness. On the whole, it appears probable that sensible changes, and even sensations, may be produced without leaving relics behind them. And it is certain that these relics of sensations may re-appear, without impressions from external objects. Hence it appears preferable to consider the receiving of sensations, and the retaining of ideas, as two separate though intimately connected operations, and as implying

two separate powers or capacities of the mind. This is not done by Hartley, who appears to refer both to sensation; and it has subjected him to some unfounded animadversions of the great northern philosopher. Speaking of the phenomena of memory as not to be entirely explained by the laws of association, Mr. Stewart says, "The association of ideas connects our various thoughts with each other, so as to present them to the mind in a certain order; but it presupposes a faculty of retaining the knowledge we acquire." Of this Hartley was perfectly aware; and he has accordingly a distinct proposition (p. 8.) on the production of ideas.

Without the retentive power, it is obvious that man would be a being of mere sensation, little if at all superior to the lowest orders of the animal creation, and inferior to many of them. The retentive power provides materials for the agency of the associative power. Without the former, the latter could not be called into exercise; and without the associative power, the relics of sensation, (the effects of the retentive power,) would be of no utility. The operations of the retentive power can scarcely, however, be separated from those of the associative power; and these together constitute the compound faculty called memory, for some account of which we refer our readers to a subsequent part of this article. We introduce the subject here, merely in reference to the generation of ideas.

We have said that the receiving sensations, and the retaining the relics of them, probably depend upon the same organic causes, whatever they be. In some instances sensible changes perceptibly continue after the sensible objects are removed. Two or three facts, which every one must have noticed or may notice, will illustrate this principle. If a piece of stick be burnt at one end, and the lighted end be turned quickly round in a circle, the luminous point will appear to the eye as a complete luminous circle; the changes of the optic organs continuing, till the image of the luminous point returns to any given point of the retina. Again, the sensible changes produced by sound, perceptibly continue after the external cause ceases. If a sounding body be struck very rapidly with a stick, we do not perceive any interval; and, as Hartley well observes, the most simple sounds which we hear, being reflected from the neighbouring bodies, consist of a number of sounds succeeding each other at different distances of time, according to the distances of the reflecting bodies, though, owing to the effect of each on the auditory organs continuing some little time after the actual impression on the external organ, the sounds appear to be exactly synchronous. The sensible changes produced by the other senses, also continue some time after the impressions which have been made upon them. If a hard body be pressed upon the palm of the hand, it is not easy to distinguish for a few seconds, whether it remains or is removed. And tastes continue to be perceived, long after the rapid substance is removed. This last circumstance may, however, be accounted for on the supposition that the rapid part of the substance is not removed; which, without doubt, is often the fact.

This play of the organs (which, however, is perhaps rather to be referred to the external than to the mental organs,) give rise, in the case of vision, to a number of very singular and interesting phenomena, by some philosophers called *ocular spectra*. A considerable variety of them are stated by Dr. R. Darwin of Shrewsbury, at the end of the second part of Darwin's Zoonomia. We shall select a few of the most striking.

Place about half an inch square of white paper on a black hat, and looking steadily on the centre of it for a minute.

remove your eyes to a sheet of white paper; after a second or two, a dark square will appear on the white paper, which will be seen for some time. A similar dark square will be seen in the closed eye, if light be admitted through the eye-lids. So after looking at any luminous body, of a small apparent size, as the sun, for instance, for a short time, so as not much to fatigue the eyes, this part of the retina becomes less sensible to smaller portions of light: hence when the eyes are turned upon any less luminous parts of the sky, a dark spot is seen resembling the shape of the luminous body. To the same cause Dr. R. Darwin ascribes those dark-coloured floating spots, which are easily perceptible when the eyes are a little weakened by fatigue, and during illnesses attended with great debility. He says, that as these spectra are most easily discernible when our eyes are weakened by fatigue, it has frequently happened that people of delicate constitutions have been much alarmed at them, fearing a beginning decay of their sight, and thence have fallen into the hands of ignorant oculists. They are not, however, he observes, the prelude to any disease; and it is only from our habitual inattention to them, that we do not perceive them on all objects every hour of our lives. As the nerves of very weak people, he continues, lose their sensibility by a small duration of exertion, it frequently happens that sick people, in the extreme debility of fevers, are perpetually employed in picking something off from the bed clothes, owing to their mistaking the cause of these dark spots. An Italian artist, a man of strong abilities, relates, that having passed the whole night on a distant mountain, with some companions and a conjuror, and performed many ceremonies to raise the devil, on their return in the morning to Rome, looking up when the sun began to rise, they saw numerous devils run on the tops of the houses as they passed along. So much were the spectra of their weakened eyes magnified by fear, and made subservient to the purposes of fraud or superstition.

Again; make with ink on white paper a black spot, about half an inch in diameter, with a tail about an inch in length, so as to resemble a tadpole. Look steadily at this spot for about a minute; and on moving the eye a little, the figure of a tadpole will be seen on the white part of the paper, which figure will appear whiter or more luminous than any other part of the paper. This Dr. R. Darwin brings as one proof, that when the retina has been subjected to a less excitement, it is more easily brought into action by being subjected to a greater. A surface appears black, in consequence of its absorbing all the rays of light; that part of the retina, therefore, which is unemployed while looking at the spot, is afterwards more sensible to the light than the other parts, and is capable of being brought into action by the red rays, which penetrate the eye-lids. A familiar fact will equally well illustrate the principle. If, when the light is pretty strong, we look steadily for a short time at a window, the wood or lead-work of which is dark coloured, on turning the sight immediately afterwards to a white wall, we have a distinct figure of the window with the panes dark and the wood-work luminous. Upon the same principle Dr. R. Darwin accounts for the following circumstance. A writer in the Berlin Memoires observes, that when he held a book, so that the sun shone upon his half closed eye-lids, the black letters which he had long inspected became red. There is a similar story told by Voltaire of a duke of Tuscany, who was playing at dice with a general of a foreign army; and believing that he saw red spots on the dice, apprehended that some dreadful events were about to take place, and retired in confusion. The observer, after looking for a minute on the black spots of a die,

a die, in a bright day, and carelessly closing his eyes, would see red spots corresponding to the black spots on the die; and if they were intense from the fatigue or weakness of the optic organ, those appearances would continue, and on looking on the die would be supposed to be upon it, just as persons in a very weak state (as has been already stated) often see black spots, which they refer to the bed-clothes.

We have stated, that the capacities of sensation and retention probably depend upon the same organic causes, whatever they may be. Dr. Darwin, in his *Zoonomia*, represents ideas as the animal motions or configurations of the organs of sense. (Sect. iii. 4. 1.) The more advanced student of mental philosophy, may derive much useful information from the perusal of that singular work; but we know no writer on the subject whose views can be received with more doubt and hesitation than Darwin's. He generalizes with extreme rapidity; and often seems to be much more desirous to urge every thing that can be advanced with any plausibility in support of his strange hypotheses, than to try them by the touchstone of fact and experience. His peculiarities of nomenclature are extremely perplexing, and in various cases very injudicious; and the number of them is so great, that they often interfere with the statement of the truest observations. We meet with remarks, which present a novel and imposing appearance, and we very frequently find, when we have taken the pains to interpret them into common language, that their novelty and importance consisted merely in their Darwinian dress. But what we most object to, is, that his nomenclature is so completely founded upon his theories, that when he is stating acknowledged truths, his expressions convey a meaning beyond them, and the whole import of them, according to his use of the terms employed, derives an apparent credibility from the correctness of them according to their usual acceptance.

Dr. Darwin employs the term *idea*, so as to include the mental changes produced by impressions on the external organs of sense, and also those which can be reproduced without the intervention of external impressions; in other words, as including sensations and ideas. And of both he maintains, that they are contractions, motions, or configurations of the fibres, which constitute the immediate organ of sense. (Sect. ii. 2. 7.) It requires little acquaintance with the principles of mental philosophy, to furnish a satisfactory answer to all the arguments he adduces for his unaccountable theory; and as it is extremely improbable, that any one will be inclined to adopt it without more proof than its author has been able to collect, we do not think it necessary to enter into any minute consideration of it. It is not only clogged with difficulties, which at once outweigh every presumption in its favour, but it has no advantage of any kind to recommend it. It accounts for no phenomena, which do not admit of an easy and, in general, preferable solution without it. We are not, however, prepared to maintain, that, in case of vivid conceptions, those mental changes, which take place without external impressions, are never attended with changes in the external organs, corresponding to those by which the original sensible changes were produced; in other words, that conceptions, *i. e.* vivid ideas of sensation, are never attended with changes in the external organs corresponding to those, by which the original sensations were produced. When we have strong visual conceptions, it *appears* as though we saw with our bodily eyes, just as if sensations were produced by external objects. If we were not aware of the efficacy of association, in the acquired power of referring sensations to the part of the body from which they

were derived, we should consider it as a fact decidedly proved by the feelings of which we are conscious, that when with the mind's eye we see an absent friend, there is a corresponding picture formed upon the retina, by the re-action of the changes in the mental organs. The effort to form such conceptions is, we think, distinctly felt in the eyes; and the writer of these remarks observes in his own case, that the effort is principally perceived in that eye, which he knows from experience to have the greatest visual power. We refer to this circumstance, however, merely as a curious fact. It does not appear, admitting that the perception of which we are speaking is not the result of association, that it enables us to account better for even the greater distinctness of our visual conceptions; for if the external organ be thus affected, it must be in consequence of the very conceptions for which it might be supposed to account. If any visual ideal changes, *i. e.* visual conceptions, are attended with corresponding affections of the retina, the effect on the sentient principle is to be attributed to the former, not to the latter; all that could reasonably be admitted, is, that in consequence of the affection of the external organ, the conception might be rendered more vivid, so as to approach nearer to the state of the original sensation. But we need not resort to this opinion, to account for the distinctness and vividness of our visual conceptions. It is a general and well known principle, that when the retentive power is vigorous, *distinct and vivid sensations produce, by sufficient repetition, distinct and vivid ideas.*

Still, when we recollect the general influence of states of mind upon the nervous system, and the known fact that certain sensorial changes do affect particular nerves, so as to produce muscular motion, and farther take into account the feeling to which we have already referred, of which we presume others also are conscious, we are inclined to think it probable, that conceptions, or vivid ideas of sensation, may be attended with affections of the external organs of sensation, similar to those which furnished the materials for those conceptions. Hartley's opinion, prop. 59, that an impression made upon one eye alone by a single object, may propagate itself to the other, and there raise up an image almost equal in vividness to itself, and that, consequently, when we see with one eye only, we may have pictures in both eyes, considerably corresponds to this hypothesis. But whatever be the fact, we do not perceive that it affords any adequate ground for the supposition, that ideas cannot exist without affections of the external organs, from which the original sensations were derived; nor the shadow of a reason for the Darwinian hypothesis, that such affections are the ideas themselves. Their effects on the mind must be produced in the common seat of sensible, ideal, and motory changes.

Though we do not think it in any way necessary to enter into any particular examination of this fundamental metaphysical position of the *Zoonomia*, we wish to notice one statement which Darwin has adduced in support of it; since, if correct, it would furnish a very singular phenomenon, connected with the exercise of the retentive power. He says, (sect. iii. 4. 4.) that "where the organ of sense is totally destroyed, the ideas which were received by that sense seem to perish along with it, as well as the power of perception." If this be so, (and it must, if his hypothesis be true,) we must indeed be merely creatures of sense, and can never expect to attain refinement of intellectual ideas, or of affections. But what are his proofs? A gentleman, who had been totally deaf for nearly 30 years, had forgotten the pronunciation of words, and, "what is much to the point," he always, in his dreams, imagined that people

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conferred with him by signs or writing, and never that he heard any one speak to him. "From hence it appears," adds the amusing theorist, "that with the perceptions of sounds he has also lost the ideas of them; though the organs of speech still retain somewhat of their usual habits of articulation." We presume that our readers will not think Darwin's hypothesis required to account for this deaf man's dreams; but to make them give support to the hypothesis, it should have been added, that this was always the case from the first moment of his total loss of hearing; and to afford any proof of it, it should farther have been shewn, that from that period he never had any recollections (we do not mean distinct conceptions, but simple recollections, distinct or indistinct) of sounds articulate or inarticulate. Respecting the ideas of sight, Darwin adduces the following statement. "I have had the opportunity of conversing with two men, who had been some years blind: one of them had a complete gutta serena, and the other had lost the whole substance of his eyes. They both told me that they did not remember to have ever dreamt of visible objects, since the total loss of their sight." Upon such facts as these the author builds his hypothesis. Did he ascertain that these men, with the total loss of sight, lost at once all their visual conceptions? Did the well-known voices of their domestic relatives cease to recall their visible appearance? Did they at once forget the features which they had long viewed with delight? These might gradually fade from their memories; and by degrees they might be unable to picture to their minds objects with which their affections were most closely associated. But we see no room whatever to suppose that this was the immediate effect; and unless it were, the theory which their *dreams* are adduced to support must be pronounced "baseless as the fabric of a vision."

If we appealed to the common experience of those who have lost their sight from ordinary causes, we should doubtless be told by the disciples of Darwin, (if such there be,) that their cases were not in point, as their immediate organs of vision might not be entirely destroyed; and though we should not hesitate to predict the reply of those whose cases are clearly in point, we have no facts to state, and leave the matter, therefore, to the reader's observation, with one farther remark. It is indisputable that our ideas of solidity, and of real figure and distance, are principally derived from the sense of touch: is there any reason whatever to imagine, that when a man has both his arms shot off, he at once loses all those notions of solidity, figure, &c. with which the organs of touch have supplied him, and which association alone enables the sight to communicate? Does he cease to perceive at once, that those objects, which his unaided sight would represent merely as a beautiful picture on a surface, are in reality solid bodies at various distances from the eye, because he has lost the organs by which he derived the ideas, now so firmly connected with the visual impression, as apparently to make a part of the sensation of sight?

Though somewhat out of place here, we must add, that the ideas we have advanced respecting the possibility of sensorial change, (sensible, ideal, and motory,) proceeding without exciting the notice of the mind, derive confirmation from the statements of Darwin on the catenation of motions (sect. xvii. 2.); and we particularly wish to refer our readers to his ingenious (and, in general, just) remarks on the progress of such catenations, in the case of a person learning music. The principles on which they are founded may be seen in Hartley's 21st proposition; but Darwin has given a more detailed view of the progress of the transition from voluntary to automatic actions, and at the same time has introduced several remarks, which illustrate some

peculiar procedures of the mind, classing under the operations of memory.

IV. *Of the Associative Power.*—This principle, if not the sole cause of all our mental phenomena, except the original production of sensorial changes and tendencies to them, has some effect in the origin and modification of all of them. It is owing to this important principle that sensations become the signs of thoughts and feelings, by which means man becomes a social being; that the whole mental furniture of perceptions, notions, affections, passions, sentiments, emotions, &c. is formed from the simple relics of sensation; that man, from mere sensation, rises to intellect; that he becomes capable of reflection, and of action. In short, whatever mental operation we attend to, except at the very earliest period of mental culture, we find association the cause of its production, or intimately concerned in it.

The fact of the connection which exists between many of our sensorial changes had long been known; but it had generally been referred to the memory. Mr. Locke appears to have been the first who employed the principle of association to account for aberrations of judgment and feeling, and for customary connections of ideas; but he does not seem to have been at all aware that all our ideas, except those of consciousness, and those which are produced by mere repetitions of uncompounded sensible changes, *i. e.* ideas of sensation, or simple ideas, are, in reality, formed by the influence of the same principle, either alone, or under the guidance of the understanding; that all our affections, and our mental pleasures and pains, are nothing more than the relics of sensation, variously combined by association. It seems that Mr. Gay, a clergyman in the west of England, was the first who endeavoured to shew the possibility of deducing all our passions and affections from association: but his remarks on this subject, as Dr. Priestley observes, amount to little more than conjecture. These, however, led Dr. Hartley to direct his thoughts to it, and by a union of great talents, and of solid acquirements in moral science, in natural philosophy, and in a professional knowledge of the human frame, with a mind unobscured by selfish tendencies, he was enabled to bring into one extensive system the progress of the mind from its first rudiments of sensation, through the maze of complex ideas and affections, to shew how man rises from sensation to intellect. As Dr. Hartley expected, his work remained for a considerable time almost unnoticed. Tucker (*A. Search*) was obviously acquainted with it, and owed much to it; though he seldom speaks of Hartley but to laugh at him, in reference to his hypothesis of vibrations: and about the time when he began his *Light of Nature*, the first volume of the *Observations*, as we have already stated, was translated into French; but it does not seem to have attracted the notice of the French metaphysicians, either at the time or since. Dr. Priestley had the merit of bringing Hartley's system forward to the public attention; and the celebrity which he had acquired among different classes of the philosophic world was favourable to his object. About thirty years after the publication of the original work, he published an abridgment of it; in which he left out the deductions from the principal theory respecting the rule of life, the truth of Christianity, &c. (in some respects, we think, very unfortunately), and as much as he could of the hypothesis of vibrations. Since that time the system of Hartley has been rapidly gaining ground in South Britain; and it is now, probably, pretty generally adopted by those who think closely on the subject. In North Britain, owing partly to theological and metaphysical prepossessions, and not less, perhaps, to Dr. Priestley's rough and unjustifiably severe attack upon three of the Scotch philosophers.

fophers, whose mental and moral character ranked high among their countrymen, the principles of Hartley have made but little progress. The philosophical systems of Scotland have been somewhat modified by it; but those who rank the highest seem little inclined to admit it in its full extent. However, the writings of Dugald Stewart shew that he has done something towards clearing the way, and the lectures of the professor of moral philosophy at Glasgow must do more; and we see reason to hope, that when the present generation has passed away, the true principles of mental science will gain a firm hold there, as well as in South Britain. We earnestly wish for the extensive adoption of the Hartleyan system; because, while it satisfactorily explains a vast variety of the most important mental phenomena, it furnishes the best guide in the moral and mental culture of the mind. The value of the Observations on Man will in some measure be perceived from those portions, or abstracts of it, which we have introduced into this article; and we shall think ourselves happy, if we shall have succeeded in making the way smoother for a judicious acquaintance with that profound and invaluable work, for such of our readers as have not previously paid much attention to the subject. We hope that the philosopher just referred to will excuse this public notice of him. The writer of this article had the great benefit of attending his class about fourteen years ago; and he feels grateful to him for the advantages he enjoyed there, both for the acquisition of valuable mental and moral knowledge, and for the aid and encouragement afforded by that liberal and enlightened professor, in the free exercise of the understanding on some of the most important objects of its attention. Unfettered by any system, though, probably, not altogether free from the influence of early biases towards the Scottish philosophy, he shewed his students by example, as well as by precept, and the exercise of their intellectual powers, in what way they ought to pursue philosophical truth; and if ever they saw reason to differ from him, they never failed to admire his candour, and to respect his sound and discriminating judgment.

We have already stated, that the associative power has two grand modes of operation, *connection* and *composition*. It is not easy to keep these distinct; but in many cases it is practicable, and often tends to precision in our reflections and reasonings. In what we shall advance respecting the operations of this power, we shall keep this distinction somewhat in view. We shall state, first, the classes of connections which exist among our sensorial changes; and, secondly, some of the principal laws of connections; we shall then proceed to detail some of the leading facts relative to compositions, and the formations of our compound notions and feelings. It might be the most regular method to begin with compositions; because connections are formed not only among simple sensorial changes, but among those also which are compounded; in other words, not only among sensations, simple ideas and single muscular actions, but also among those which have been blended together into complex states; and we shall sometimes have occasion, in what we state relative to connections, to suppose such compositions actually formed. On the other hand, connections are much more obvious, and more easily comprehended, than compositions; and a statement of some facts respecting the former will lead to an easier acquaintance with the latter.

“That one thought is suggested to the mind by another,” says the elegant and philosophic Stewart, “and that the sight of an external object often recalls former occurrences, and revives former feelings, are facts which are

perfectly familiar, even to those who are least disposed to speculate concerning the principles of their nature. In passing along a road which we have formerly travelled in the company of a friend, the particulars of the conversation in which we were then engaged, are frequently suggested to us by the objects we meet with. In such a scene, we recollect that such a particular subject was started; and in passing the different houses, and plantations, and rivers, the arguments we were discussing when we last saw them, recur spontaneously to the memory. The connection which is formed in the mind between the words of a language, and the ideas they denote; the connection which is formed between different words of a discourse which we have committed to memory; and the connection between the different notes of a piece of music in the mind of a musician; are all obvious instances of the same general law of our nature. The influence of sensible objects in reviving former thoughts and former feelings, is more particularly remarkable. After time has, in some degree, reconciled us to the loss of a friend; how wonderfully are we affected the first time we enter the house where he lived. Every thing we see, the apartment where he studied, the chair upon which he sat, recall to us the happiness we enjoyed together; and we should feel it a sort of violation of that respect which we owe to his memory, to engage in any light or indifferent discourse when such objects are before us.” So, again, every one must have noticed the connections which exist between our thoughts or sensations and muscular actions. A performer looks at the notes of his book, and the appropriate motions of his hands and fingers follow with immediate succession. While we are writing, the thoughts we wish to communicate suggest the appropriate words, and these, with an almost instantaneous succession of motions, are written on the paper before us. We are perhaps more struck with this in writing short hand than long; the characters appear as the representatives of our thoughts, almost without knowing how they are made.

All these facts are obviously nothing else than cases of those connections which are formed, by the operation of the associative power, among our sensorial changes; in other words among our sensible, ideal, and motory changes; in other words, again, but less generally, among our sensations, ideas, and motory changes. We should, in some respects, prefer, in what follows, employing the terms *sensible changes* and *ideal changes*, rather than the terms *sensations* and *ideas*; because these imply consciousness, which we have before stated is not necessarily excited by the operations of the sensitive and associative powers: we shall, however, content ourselves with requesting the reader to bear in mind, that whatever may be said respecting connections among sensations and ideas, might be stated more generally respecting connections among sensible and ideal changes. Whatever the sensorium be, or whatever be those changes of it which excite the consciousness, it is, we conceive, among those changes that connections and compositions take place.

1. *Classes of Connections.*—*First*: a *sensation* may be associated with other *sensations*, with *ideas*, and with *motory changes*.

A *sensation*, after having been associated a sufficient number of times with another *sensation*, will, when impressed alone, excite the simple idea corresponding with that other sensation. Thus the names, smells, tastes, &c. of external objects, suggest the idea of their visible appearance; and the sight of them suggests their names, &c. In the same manner, a word half pronounced excites the idea of the whole

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whole word; the mention of the letters *a, b*, suggests the idea of *c, d*, &c.; the sight of part of an object suggests the idea of the whole; and the sight of one object, recalls the visual idea of other objects which have been uniformly or very frequently seen with it. Innumerable other instances might be given with little trouble; but we shall mention only one other, which may assist some of our readers in accounting for certain cases of apparitions. L. was one day hastily passing by a room in which a very excellent friend had usually sat, in a particular chair, and in a particular part of the room. His thoughts at the time were employed on some object which did not excite deep attention; and the sight of the chair raised in his mind a vivid visual idea of his friend as sitting in that chair. The friend had been dead some weeks, and L. involuntarily came back for another vision, but without effect. Such visual ideas and similar ideas derived from the other senses, particularly the hearing, are by Dugald Stewart called conceptions; and where they are vivid and easily excited, they frequently lead those who are inattentive to their sensations, to suppose that they actually saw and heard, at a particular time, what they did not see or hear.

*Sensations* become connected with *ideas*, so that the repetition of the sensation will excite the connected idea. Of this case of connections, the following will serve as examples. Words associated with ideas will readily excite them, even when very complex; the words *hero, philosopher, justice, benevolence, truth*, and the like, whether written or pronounced, immediately call up with precision the corresponding idea. The hearing of a particular national tune, is said to overpower the Swiss soldier in a foreign land with melancholy and despair; and it is therefore forbidden in the armies in which they serve. The sound recalls various heartfelt recollections; the idea of the tranquillity and freedom of their country, of the home from which they are torn, and to which they may never return. What trains of interesting thought and feeling are usually called up in the mind by the sight of the scenes of early pleasure, where passed those years when novelty gave charms to every sensation, every employment of the faculty, when hope presented no prospects but what were decked in "fancy's fairy frostwork," and present joys precluded all regret for the past.

*Sensations* may be connected with *muscular action*, that is, with those sensorial changes which are followed by muscular action; so that the sensation will excite the muscular action, without the intervention of that state of mind which is called will. A person automatically, that is, without any volition, turns his head towards another who calls him by his name. When the hand of another is rapidly moved towards the eye, we shut the eye without thinking about it, or even being conscious of it. When copying from any book, if a person is very familiar with the employment, the appropriate motion of the fingers immediately follows the impression produced by the appearance of the word. In the same manner the visible impression derived from musical notes regulates the motions of the performer. "While I am walking through that grove before my window," says Darwin, "I do not run against the trees or the branches, though my thoughts are completely engaged on some other objects;" the sensible impressions produced by the objects around, excite in the sensorium the appropriate connected motory changes, and these the action of certain muscles.

*Secondly: ideas* may be connected with *sensations*, with *ideas*, and with *motory changes*.

An *idea* associated a sufficient number of times with a *sensation*, will excite the simple idea belonging to that sen-

sation. Thus the ideas, whether simple or complex, which have been sufficiently associated with names, excite the ideas of their respective names. Hence it is that we find ourselves continually thinking in words; that is, the trains of ideas which pass in our minds, are accompanied with their corresponding expressions, when those expressions are familiar to us; and it may be remarked, that the habit of thinking in words, is one which contributes greatly to accuracy and facility of thought, and therefore one which the young reasoner will do well to cultivate. Those who are habituated to reasoning, find their trains of reasoning to generally clothed in words, and words so necessary to their intellectual operations, that the words are what they most attend to; and some have even gone so far as to suppose, that *general* reasoning is concerned merely about words, and not about ideas. They seem to lie under a similar error, with those who imagine that the visible appearance of objects is all we attend to, when we speak of magnitude, shape, &c.; whereas the fact is, that the visible appearance is nothing more than a symbol, which serves to introduce the connected complex idea into the mind, and to keep its parts connected; and this is the grand end of words in general reasoning. We are conscious while we are thinking, of employing the relics of audible sensations; we seem to have faint sensations of sound passing in the sensorium; but it appears probable that those who have long lost the use of their hearing, and have generally employed sight as the inlet of knowledge, have a train of visual, instead of audible conceptions. All, however, which we particularly wish to have noticed here, is, that these things afford instances of the connections of ideas with sensations, so that the idea introduces the simple idea belonging to that sensation.

Next, an *idea* associated with an *idea*, whether notion or feeling, will excite that idea. Thus the idea of benevolence will excite that of merit; of courage, that of honour; of great talents, that of respect; of cruelty, that of horror; of meanness, that of contempt.

Again, an *idea* associated with a *motory change*, will excite that motory change, and its consequent muscular action. Thus, the desire to perform a particular action will produce the corresponding voluntary motion of the limbs; joy produces a pleasing cast of countenance; fear excites trembling; and horror, distortion. In the same manner when we are employed in committing our thoughts to writing, the idea of the words which we intend to commit to paper, if the character be not peculiar, or novel, will immediately suggest and be followed by the appropriate motions of the fingers, and this without the intervention of volition, sometimes without even the consciousness of the motory changes, or of the muscular actions produced by them. So also in speaking, unless some difficult pronunciation occur, the muscular actions requisite for the formation of the sounds follow immediately the conception of the words, without the intervention of the will.

*Thirdly: motory changes*, and their corresponding muscular actions, may be connected with *sensations*, with *ideas*, and with other *motory changes*, and their correspondent muscular actions.

*Muscular actions* may be associated with *sensations*; that is, when muscular actions have been sufficiently long associated with sensations, the repetitions of the muscular action alone will excite the simple idea belonging to that sensation. Thus, the action of dancing will bring to mind the conception of the music with which it has been often accompanied. Again, children often accustom themselves to particular motions of the limbs, while committing to memory, or while repeating

repeating what they have learnt; and those muscular actions in many instances become necessary to their correct, and ready recollection, and even to their recollection at all. Addison, says Miss Edgeworth, represents with much humour the case of a poor man, who had the habit of twirling a bit of thread round his finger; the thread was accidentally broken, and the orator stood mute.

So again, *muscular actions* may be associated with *ideas*; that is, when muscular actions have been sufficiently long associated with ideas, those muscular actions will excite those ideas, whether notions or feelings; thus dancing will introduce cheerfulness into the mind. So particular muscular actions have, from habitual connection, a tendency to excite certain trains of thought or states of mind: those who have been accustomed to one posture while studying, find it difficult to study so well in other postures; and persons who, while engaged in deep meditation, have been accustomed to any little motions of body, find the continuance of those motions requisite for the continuance of their abstraction of mind. It is upon this principle, that certain postures of body have a tendency to produce those feelings which all should have when addressing the Supreme Being. The cases, however, in which muscular action introduces ideas, either simple or compound, are much less numerous than those in which sensations and ideas introduce muscular actions. In fact it is not the usual order of association; and besides, it is sometimes very difficult to say what effect is produced by the muscular action itself, and what by the sensations which generally accompany muscular action. In the next case the point is clearer.

*Muscular actions* become connected with other *muscular actions*, that is, the motory changes which produce the one, with those which produce the other; so that the former may introduce the latter without the intervention of the will. If different muscular actions are produced together, they are called *synchronous*; if one immediately follows the other they are called *successive*; and the association is, in like manner, termed *synchronous* or *successive*. The motions of the hands when a person is playing upon the pianoforte, the motions of the hands in weaving and in spinning, and various other muscular actions which will readily suggest themselves to the reader, may be stated as instances of *synchronous* associations of muscular actions. The motions of the organs of speech, in reading or speaking, of the feet in walking, and of the fingers in writing, are instances of *successive* associations of muscular actions.

These nine cases of the association of sensorial changes are comprehended by Hartley in the following general theorem: "If any sensation A, idea B, or muscular motion C, be associated for a sufficient number of times with another sensation D, idea E, or muscular action F, it will at last excite, *d*, the simple idea belonging to the sensation D, the very idea E, or the very muscular action F." The sensation itself cannot of course be re-excited, because that depends upon the presence of the object of the sense; but sometimes, as in the instance already stated, the simple idea belonging to a sensation is so vivid, that it equals, if not surpasses, the original sensation; that is, any sensible change, and its simple ideal change, are the same in kind, differing only in vividness, and sometimes equal in that respect. It may also be well to observe here, that when Hartley and his disciples speak of muscular actions clinging together, they obviously mean, that the motory changes of the sensorium become connected together, and not, as some writers seem to have supposed, and indeed as their words imply, that the motions of muscles are connected without any intervention of the mind, taking the term in the popular sense. It is

true the Hartleyan supposes that volition has nothing to do in the association when complete, though originally perhaps concerned in the formation of it; and also that the association may go on without even exciting the consciousness; but we know of none who suppose that the mental organs, (the mind in the popular sense,) are less concerned in the connections among muscular actions, than in those among sensations and ideas. All the sensorial changes may and do become connected together; and, as we apprehend, the one may produce the other, and so on, without the consciousness being excited; but no external impression, which does not act by stimulating or impelling the moving muscle, can produce muscular action without the action of the mental organs; and in like manner, no muscular action can produce another muscular action, (except what may be termed mere physical motion, such as might be produced by any foreign body mechanically acting upon the muscular system,) without the action of the mental organs. The whole of the connection is mental, and we think if this idea be kept in view, and employed in the explanation of the Hartleyan phraseology respecting connections among muscular actions, that it will remove some of the difficulties which are felt respecting this part of the Hartleyan system, and shew that the objections which have been urged against it, arose from an incomplete idea of it.

2. *Laws of Connections*.—We now proceed to our second object, *viz.* to point out and illustrate some of the leading laws of that class of associations which we term connections; premising that many of the observations which follow are, as the reader will readily perceive, equally applicable to that class which we term compositions. These laws regard, 1. The strength of connections; 2. The duration of connections; 3. The formation of connections by means of immediate links, which we may call the law of transference; and 4. Habitual biases to particular kinds of connections.

(1) *The Strength of Connections*.—The strength and durability of connections, depend partly upon the degree of attention with which the connected sensorial changes have been attended, and partly upon the frequency with which they have recurred in connection: less generally, partly upon the vividness of the connected ideas, and partly upon the frequency with which the connected ideas, or muscular actions, have recurred in connection. We may adduce, as an illustration of the former cause of strength and durability, that circumstances of a light and trivial nature, which have occurred while our minds were occupied with subjects of great interest, form no connection with the concurring train of ideas, even if the attention were, for a time, drawn off by the former. For instance, suppose we were attending to an interesting discourse, if our attention were for a moment called off by the coughing of a person near us, the train of thought suggested by the sermon would form no connection with the cause of the interruption, and it would pass in the mind without the idea of the interruption being produced. But supposing a poor man to have fallen down in a fit of apoplexy, the circumstance would strongly interest our sympathy and excite our attention; many feelings would be brought into active exercise; and the ideas which were at that time in the view of the mind, would probably ever after present with them those of the scene which so strongly affected us. Hence the importance, that those who have the care of education, should seize the happy moments when circumstances have peculiarly interested the mind, to connect with them those related acts of prudence, benevolence, and piety, which, so introduced, may have a lasting effect in regulating the disposition; but which brought in a form less interesting, would have no permanent bond of union,

and would soon be obliterated. Hence, too, the importance of instilling into the mind those principles which are designed to have a constant operation among the thoughts and feelings and actions of life, in such a form that they shall become connected with those thoughts and feelings which have already a firm hold in the mind; and thus be brought into view, and excited into action much more frequently and uniformly.

The effect of frequent recurrence, in producing strength and durability of association, may be best explained by the associations which take place between words and their corresponding ideas. These connections are not, in general, attended with any particular cause of association, except frequency of recurrence, and therefore they are the most unexceptionable instances. Now, other things being equal, we find that those words which are most frequently called up in the mind, in connection with the ideas to which they belong, have a closer connection with those ideas; that is, the idea suggests the word and the word suggests the idea, with greater certainty, and the association is more permanent. The following remarks of Dr. Percival will illustrate this general principle. "Slight paralytic affections of the organs of speech, sometimes occur without any corresponding disorder of the other parts of the body. Hence the effort to speak succeeds the volition of the mind slowly and imperfectly, and words are uttered with faltering and hesitation. These are facts of common notoriety: but I have never seen it remarked, that in these local palsies, the pronunciation of proper names is attended with peculiar difficulty; and that the recollection of them becomes very obscure, or is entirely obliterated; while the recollection of persons, places, and things, remains unchanged. This confirms the theory of associations, and at the same time admits of an easy solution by it. For as words are arbitrary marks, and owe their connection with what they import to established usage, the strength of this connection will be exactly proportioned to the frequency of their recurrence, and this recurrence must be more frequent with general than with specific terms."

Besides these two universally operating causes of the strength and durability of associations, it is proper to observe, that they depend also upon the predisposition of the mind, the habitual bias of thought and feeling, and the prevailing cast of the associations already formed. This may in part be resolved into the first cause,—the degree of vividness of the connected ideas; but in part it must be considered as separate. Where there are associations of a contrary tendency, the production of the new association implies the destruction of the old one, and this is one reason why persons who have passed the prime of life, feel it so exceedingly difficult to acquire new associations dissimilar from those already formed. Hence it is that all those improper biases of thought and feeling which oppose the best regulation of thought and feeling, should be carefully shunned; all those associations carefully prevented, which lead the mind away from God and duty, or which simply check the reception of those which accord with the dictates of religion. They do more than directly injure by their own existence; they injure also, and this in no small degree, by preventing the formation of those associations which directly prompt to the course which duty points out.

An acquaintance with these principles leads us to the direct method of confirming associations which are essential to our well being; suppose, for instance, the connection of a regard to the will of God, with the conduct: we should endeavour to connect as much as possible those pleasurable feelings which have a tendency to strengthen the links of union; we should cultivate the connection by frequently, and,

indeed, continually bringing it into action; and we should carefully cultivate those related states of mind which have a tendency to foster and strengthen the connection. To avoid weakening it, we should be careful not to introduce any contrary trains of ideas; for instance, we should never connect feelings of ridicule with any thing connected with religion, and should carefully avoid those breaks in the association which will follow neglect in its cultivation. And it is a most satisfactory idea, that if vicious associations may be formed so strong as to lie beyond the power of the individual to annihilate them, virtuous associations may also be formed so vigorous and permanent as to bid defiance to time and to temptation. These shall survive the wreck of nature, and shall adorn the mental fabric, when this world, and all its sorrows and enjoyments, shall be no more.

(2) *The Disunion of Connections.*—As connections are necessarily formed, and frequently without any volition on the part of the individual, by the before mentioned circumstances, it is another very important law of the associative power, that these connections are not indestructible. We observe, then, that an association may be destroyed, either by the formation of other contrary associations, or by the repetition of it being in some way or other prevented. We have already given one instance of this principle, in *MOR. ED.* col. 49, to which we refer our readers: and as in that case, so in numerous others where an association unfortunately exists in the mind unfavourable to the formation or exercise of good dispositions, it may be weakened, (gradually, indeed, but certainly weakened,) and at last destroyed by the steady culture of opposite associations. That conduct to which pious benevolence prompts, may acquire so attractive an appearance, that ideas of difficulty, of pain, of ridicule, which may have been attached to it, and which may have impeded its exercise, will gradually give way to those which the divine approbation affords, of present peace and future happiness. But there is not always time for this slow procedure. It may be necessary for individual happiness, that the baneful association should be destroyed without one repetition of it to confirm its power. To the general culture of opposite associations, must then be added, a steady careful prevention of the introduction of the connected ideas. Situations must be avoided, words disused, company shunned, which have a known tendency to introduce a train of thoughts leading to the first link of the chain which we wish for ever separated.

When we hold it out as a grand law of association, that connections may be disunited by forming opposing associations, and by preventing their repetition, we would by no means represent it as in general an easy, or as in all cases a practicable task. When associations have been long formed, and often repeated, particularly where they accord with the general bias of the mind, they often bid defiance to the most strenuous exertions of the individual. If he could for a long time prevent their repetition, and successfully cultivate opposing ones, the most inveterate associations would by degrees loosen their power; but when associations have been strengthened for a long period of time, by being frequently brought into play, and connected with other active associations, and at the same time accord with the prevailing disposition of the mind, the prevention of their repetition, and the culture of opposing associations, are scarcely practicable. These things may be viewed in various lights; some gratifying to the mind; some which must urge every thoughtful person to shun the formation and culture of those associations which he must some time or other wish to break. While they teach us to be assiduously careful to prevent all such, they also shew us that those which we must wish to cherish may,

may, as well as others of a contrary character, become invincible; and while they direct those who have the care of the young, carefully to cultivate those tendencies to feeling and action, which may serve as a check upon improper associations,—while they direct them carefully to prevent those which may acquire a despotic rule in the mind to the destruction of peace and virtue,—they also diminish the anxiety which we are sometimes prone to feel, when we find ourselves unable to mould them exactly to that standard of thought and feeling which we wish.

Numerous are the associations, particularly of a speculative nature, which yield to the influence of time and change of circumstances. In many instances, the destruction of the association depends upon the efforts of the individual, but in the greater number it is occasioned without his direct efforts, by the increase of his knowledge, by circumstances preventing the recurrence of the association, or by the formation of contrary associations upon more solid grounds. But that they may be broken, should never be allowed as a reason for the formation of improper associations; for the difficulty is frequently great, in many instances insuperable, except by such discipline, such peculiar concurrences of circumstances, as fall not to the lot of every individual. The association between certain motives and that state of mind which we call volitions formed in early life, and strengthened by frequent repetition, is frequently found so indissoluble, that it leads the unhappy individual to act against his better judgment, and the destruction of his corporeal, and even of his mental energies, produced by his conduct, prevents those exertions for his release which he wishes to make, but has not the power to attempt. In every mind, more or less, circumstances generate desires and passions, these generate volition, and volition produces action. How few are there, who have attained the power of voluntarily separating passion and volition, or rendering them less connected, or of repressing those passions which were previously invariably connected with the circumstances which gave them origin. In all men the train of thought is partly involuntary: how few are there, who are capable of directing their associations into one channel by the exertion of volition, and employing them in one definite way; of destroying improper associations, and of forming new ones, actuated by a view to the claims of duty, and to their improvement in wisdom and virtue. How frequently do we see others, and self-knowledge will shew us repeated instances which come home to our own bosoms, in situations where they act against their better judgment;—a situation which is so forcibly described by the Apostle, “For that which I do I allow not; for what I would, that I do not; but what I hate, that I do.” This we can easily account for upon the principles of association. He who is in such a situation, may be convinced that certain actions are wrong; that they will infallibly injure his future happiness; that they must embitter his present enjoyment: but his conviction comes too late. The object which promises the gratification of some or other of his powerful principles of action, presents itself to his mind; it strongly prompts his desires and passions; the association between these and volition is perhaps of very long standing, confirmed by repeated exercise, not counteracted, or but weakly, by any contrary associations, or by any exertion of the individual; it cannot be overcome but with extreme difficulty; the mind sinks under the trial; and the commission of the action tends to strengthen the association, to render the mind still more the slave of vice and misery. The picture unhappily is not too highly drawn; and though the habit may not be so deeply fraught with misery, few are those who can say that they have not one confirmed habit, which they would wish

to change, or at least to weaken. And to those who have made the attempt to destroy any habitual connection between external impressions and desire, or between desire and volition, the difficulties cannot have appeared trifling.

(3) *The Law of Transference.*—We now proceed to state and to explain that important law of association, agreeably to which associations are formed by means of intermediate links. We must here request our readers to bear in mind, that we use the word *idea* in the wide sense in which it is employed by Hartley, to denote every internal feeling except sensation, whether simple or compound, whether or not accompanied with pleasure or pain. The law to which we have referred may be thus stated. One idea may become connected with a second, by means of their mutual connection with a third; and, where it is not necessary to attend to this third or intermediate idea, the more the connection between the first and second is confirmed, the less will the third be perceptible; so that when the association becomes completely fixed, the intermediate idea is often lost entirely from the view of the mind. The absence of the intermediate idea is often so complete, that its ever having been present can only be discovered by tracing the progress of the connection between the extremes: and in certain cases, where the association has been long in a perfect state, the difficulty may become so great, that we are inclined to admit the supposition of an intermediate link, only because we can trace it in other similar cases, and perhaps in the very same connections in other individuals, whose habits are less fixed. This law, or mode of operation of the associative power, meets us at almost every step of our reflection at what passes within us. It may be termed the law of transference, and we shall state it again in another form. Let A, B, and C, represent three ideas, simple or compound, pleasurable, painful or indifferent. If A is connected with B, and B with C, A may be transferred to C, (through their mutual connection with B,) and be recalled by it, without B being present in the mind.

This is an exceedingly important and constantly operating law of association. It is thus that numerous, almost innumerable phenomena are produced, which at first sight appear inexplicable, upon any known principles, and which therefore are referred to instinct; that is, they are supposed to result necessarily from the conformation of the mind, without the operation of any acknowledged faculty of the mind. Such are the belief in what is called self-evident truths; the pleasures derived from objects which do not affect the mind by direct sensations, disinterested affections, &c. Whenever we meet with the word *instinct* applied to the human mind, we are to consider it simply as an appeal to ignorance; and though it seems often to be held out as the solution of a difficulty, it is, in fact, nothing more than saying, the feeling, or whatever else it be, springs up we know not how, we know nothing of its origin, progress, or exercise. The term *instinct* explains nothing; and though it is conveniently used with respect to the minds of brutes, of which we can learn nothing with certainty, yet when applied to the human mind, respecting whose operations we may often gain correct ideas, it is worse than saying nothing, for it stops investigation, by a pretence of knowledge. It is true we cannot trace many links in the chain of cause and effect: but as far as the great Creator has furnished us with powers, we need not be afraid to employ them, while their employment is conducted with judgment and caution. We do not say that all those feelings which we are apt to call instinctive, can, in the present state of our knowledge, be completely analyzed and traced to their origin; but while so many can, (so many too which in no respect differ from those which we

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cannot account for, except in the opportunity which we have of accounting for them,) we have a full and fair right to expect, that as attention to mental science increases, these difficulties will diminish, and that by degrees the whole of our mental furniture, except ideas of consciousness, will be traced, as we can trace a great part of it, to sensations, retained by the retentive power, and combined and variously modified by the associative power. We have no objection to the term *natural feelings*, &c. rightly explained. We understand by it those feelings, &c. which in all cases, where there is not something peculiar in the individual, will spring up in the mind, in consequence of the influence of generally occurring circumstances, upon the powers with which the great Former of the mind hath endowed it. For instance, the parental feelings, the filial feelings, &c. are natural feelings: in all cases where there is not something wrong in the individual, these feelings will spring up in his mind in consequence of the influence of generally occurring circumstances upon the powers with which the mind is endued. So also, a great variety of other feelings, which, with the strictest propriety, may in this sense be termed natural. Some objection, however, lies against another word often used in a similar way. Such feelings are said to be *implanted*. If the word be understood to mean nothing more than what some do mean when they use it, that the feelings, &c. spring up in the mind with the same certainty as though they had made a part of the original structure of the mind, all is well. But if it be understood to mean, that these feelings do form a part of the original structure, then it implies the same cutting of the Gordian knot, the same appeal to ignorance, which is implied in the use of the word *instinctive*. If, however, we can restrict its signification, we may use it without injury. Let it mean no more, than that the feelings, &c. to which it is applied, are the necessary results from those powers which the Supreme Being has implanted in us; in fact, let it have the same general meaning as *natural*, with rather more force, denoting the *necessity* of their arising from the powers which are given us; and we shall not be giving way to those erroneous views which we must unlearn before we can acquire truth.

We need not go far for instances which will explain the law of transference. Suppose a person acquiring another language, the French, for instance. He learns the meaning of a French word by means of the corresponding English word: by degrees, as the French word becomes familiar to him, it is understood without the English word being thought of. Here the signification, (that is, the idea connected with the word,) may be called A, the English word B, and the French word C; by frequent connection between A and C, by means of B, A is transferred to C, *i. e.* the signification is transferred to the French word, so that B, the English word, is no longer wanting to form the link of union. When a young person has acquired some facility in constructing French, he generally reads his French work in English; but when he has acquired a pretty complete knowledge of the language, he reads it in French, that is, he understands it without the intervention of the corresponding English words. Those who are conversant with short hand, can read it without thinking of the long hand; yet they learnt the former through the medium of the long-hand words. Those who have long learnt to read, and who read much to themselves, seldom think of the sound of the words when they are reading in this manner. When we are pretty familiar with a subject, a single glance of the eye over a page of a clear printed book, will convey to us an idea of its contents, when perhaps not a single word has particularly attracted our attention, when certainly there has not been time

for the mind to think of the sound of the words. We do not recommend this habit of reading for young persons, but simply state a fact which is very useful and convenient to the mind when it has gone through sufficient discipline of accuracy, &c. Now it is obvious, that in almost all cases, persons learn to understand written words through the medium of spoken words. One more instance, and we have done with mere illustration. Those who are familiar with writing never think of the printed word, unless any particular circumstance call it to the mind. Yet there are few instances in which the written word is not connected with the spoken word, by means of the before learnt printed letters or word.

We now proceed to shew the application of this law, in explaining certain phenomena of belief, and the origin of the disinterested affections. We are not now to attempt the explanation of the formation of the complex feeling which we call belief, nor of those complex states of mind which we call affections; but supposing them formed to explain some facts respecting them, that is, to shew how these facts accord with the general law of association which we have been stating. Belief is transferable from the steps of the reasoning to the result of that reasoning. Suppose a proposition depends for its truth upon a great number of other propositions, if as we go along every step is believed to be true, and every connection of one step with another appears to be a just one, the feeling of belief is successively transferred from one step to another, till at last we come to the result, the proposition which we wish to prove, and the feeling will be connected with this, and will remain with it, when all the steps by which its truth was shewn are entirely lost from the view of the mind. Every one admits this; and every one who has gone through the process knows it to be so. There are almost innumerable instances in which we find the feeling of belief connected with ideas, without our being able at once to say, or even to say at all, how we acquired the connection. In this instance some philosophers refer to certain instinctive principles, by which we are necessarily led to believe, without any further reason than that our mental constitution compels. But, we repeat it, we need not resort to such hypotheses; they do great injury by checking the researches of the intellects, and, in some cases, by leading people to suppose opinions well founded, which have no further ground than an almost accidental, or, at any rate, unjust transfer of belief, by means of what was itself perhaps entitled to no belief. There are certain results of reflection and observation which we call experience, and it is generally wise to trust to them. But before a man yields to his experience, in opposition to the clear evidence of others, or to well founded and well connected reasonings, he should consider what experience is, and on what ground he has connected belief with it. He will find that belief is not a necessary attendant upon his experience, but that it has been connected with it by means of intermediate links, which might themselves have no satisfactory claim to belief. For instance, if a man has not observed accurately, or has not a correct judgment, his experience may not be worth any thing, nor entitled to any belief. Now, in many cases it is almost impossible to recall the intermediate links, in order to prove to ourselves the correctness of our experience, and yet we must act upon it; this shews the importance of cultivating in early life those habits of cool judgment and accurate observation, which shall give us a full right to believe, and to act upon our belief in the results of reflection and observation. But some truths, it may be thought, have a necessary connection with belief. We admit that there are truths which are so accordant with all the grounds of belief,

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that they instantaneously excite the belief of those who have had the opportunity of knowing those grounds; but no further. You immediately believe, that  $2 \times 2 = 4$ ; and you would think that man destitute of common sense, who denied it, or who did not immediately admit it. Yet we are well convinced that the belief is formed gradually in consequence of a number of external impressions; or, to state it more familiarly, by frequently counting in the early part of childhood. We perhaps have not the power of discovering the exact steps by which we have ourselves proceeded to the belief of this truth, but we can observe them in others, and we can trace them in ourselves, in similar circumstances. Belief in such truths is often formed through the medium of parental authority, or that of instructors, and it is probable that, in many instances, children know no more why  $12 \times 12 = 144$ , than that they find it so in their multiplication tables; but even where it has been formed by trials of the truth, those trials are generally forgotten, and the truth alone is remembered. We should gladly enlarge more on these points, but what has been already said will probably answer the two purposes which we have in view, to shew the operation of association in transferring belief; and in leading to the inference that belief ought not to be regarded as a *proof* of truth; and yet, that the being unable to point out all the grounds of belief, is not of itself any reason why that belief should be given up.

A few remarks on the opposite opinions which have been entertained respecting the disinterestedness of the human mind, will be found in *MORAL Education*, col. 27, 28. It is only by reference to the operations of the associative power, that the real state of the case can be thoroughly understood or explained; and we regard the explanation which the theory of association affords, of the origin of affections, and their progress from their selfish character towards disinterestedness, as intitling it to the highest rank among the discoveries of philosophy,—whether we consider the immense variety of mental phenomena for which this principle accounts, or the vast importance of its application to moral culture.

When an affection has arrived at its most complete state, in which it has no farther end than its own immediate object (that is, when the object is desired for its own sake), the affection may be termed disinterested; but as this term has already a more confined application, and it would thus be applied not only to the worthy but to the baneful affections, (so that we should be compelled to speak of disinterested cruelty, disinterested avarice, &c.) we shall, for want of a better appellation, term those affections which are in their ultimate state, *ultimate affections*. Premising this, we shall endeavour to explain the progress of an affection, from the state in which the object of it is a mean, to that in which the object of it becomes the sole end, that is, in which it is an ultimate affection.

The most simple instance is the love of money. Money is first an object of pleasurable feeling, merely as a means of procuring other things which are regarded as objects of desire. For a moment we may sometimes think of it, as having some intrinsic value independently of its utility as a means; but we may satisfy ourselves that this is not the case, by observing how little it is an object of interest to children who have not heard much about it, or seen it employed, or employed it themselves. A child is perhaps pleased with a piece of money as a plaything, but nothing farther; and children sometimes advance considerably far in life before they feel its value. E, a boy seven years old, was presented by his father with half a crown, as a reward for a very successful and persevering effort: he was de-

lighted with the approbation which was shewn him; and as far as the money was a mark of that approbation it pleased him; but obviously nothing farther. In small families, children generally learn the value of money early: and we therefore mention the preceding circumstance as an illustration of what we have just said, that originally it is merely desired as a mean. As persons advance in life, money is continually found to be the means of a great number and variety of the sources of present enjoyments; hence pleasurable feelings are continually connected with it, and it becomes more and more an object of desire. In this stage of the progress of the love of money, it is desired as the means of procuring certain pleasurable feelings, without reference to the objects by which those pleasurable feelings are directly produced; and even in this state of it we find an instance of the law of transference: the pleasurable feelings resulting from the objects procured, or to be procured, by money, are associated with the money itself, without reference to those objects. To revert to one of the modes in which the law was proposed; the pleasurable feelings which purchasable objects produce, the idea of those objects, and the idea of money, are the three sets of ideas. Money procures the object; the object the pleasurable feeling: hence the pleasurable feeling becomes connected, by means of the intermediate links, with money; and hence money becomes an object of desire, without any reference to the means of gratification which it procures. Here, to use the other phrasing, the pleasurable feelings may be represented by A; the objects which produce them, by B; and the money which procures those objects, by C: by frequent connection between A and C, by means of B, A is transferred to C; that is, the pleasurable feelings are transferred to the idea of money, and consequently to money itself, and are called up by it without any reference to B, the objects by which those pleasurable feelings were originally excited. The law of transference may, in this instance, and in many others, be carried one step farther. In the state to which we have advanced, money is desired on account of the pleasurable feelings with which it is connected; but by degrees the desire is transferred from those pleasurable feelings to money itself; and money is loved for itself, without any reference to those pleasurable feelings. This is so important a fact in our mental constitution, that we deem no apology necessary for endeavouring so much at length to point out its application. In this last stage of the affection, A is the desire excited by B, the pleasurable feeling excited by C, the idea of money; by means of B, A, the desire, is transferred to C, the idea of money; and thus money comes to be desired for itself without any reference to the pleasurable feelings which it is the means of procuring. In this state the desire of money is become an ultimate affection; it is no longer desired as a means, but as an end; it is desired on its own account. Some remarks on the peculiarities and checks of this affection, will be found in a subsequent part of our article.

Illustrations of a similar kind might be offered, respecting the filial, the fraternal, and even the parental affections; and it might be shewn that they are only gradually disinterested; but that, at the same time, the natural tendency is to disinterestedness, and that it is only where disinterestedness is opposed by the culture of wrong affections, affections which, when in their ultimate state, are ever selfish, and by neglect of those which are in all their stages worthy, and which hasten the moral progress almost indefinitely, that the mind stops at partial disinterestedness, or sinks into confirmed selfishness. We have already, however, in *MORAL Education*, col. 9, &c. and 28, &c. given an outline of the

origin and progress of the filial affections, and of the formation of disinterested benevolence; and we would request our readers, before they proceed, to peruse our remarks on the latter point, as affording decided illustration and explanation of the law of transference, by which *means become ends*. With the same view we shall here add, that the desire of doing good may itself be sometimes lost from the view of the mind, in attention to the means of doing it. Some of our readers, probably, take an active interest in the welfare of institutions for the benefit of the poor and afflicted. These institutions were planned by benevolence, and benevolence still prompts the support of them. It is the desire of doing good which has led to the frequently returning exertions which are made to keep them in vigour; but we have no doubt that the welfare of one or other of these institutions will often be found to be an object of the mind, without reference to the good it does. The mind rejoices in its success, without thinking of the benefit which will result from it. As soon as the attention is directed to its beneficial effects, the mind dwells upon them as the ultimate source of its satisfaction; but they were not immediately in its view. Whether or not we have been successful in leading our readers to feel the force of the assertion by this illustration, we are confident of the fact, that the means of doing good very often themselves become ends; and that the desire of their successful furtherance, which was originally felt for them, merely on account of the good known or imagined to result from them, is at last felt without reference to that good; though, on the other hand, it would by degrees, though perhaps not very soon, decay, if it were satisfactorily proved, that the means of the hoped-for-good were, and must be, wholly inefficacious.

But there would be no end to illustrations of this law if we were to trace it out in all its operations. We are continually loving things because —, and afterwards loving them for themselves alone. It extends to the love of duty in general, without any reference to particular branches of it. All the pleasurable feelings which these produce, and all the tendencies and dispositions to the practice of them, by degrees become connected with the idea of duty in general, which is a fact derived from the ideas of particular branches of duty. Hence duty in general becomes an object of desire and exertion, because parts of it are desired and pursued on their own account; and this hastens the progress of a disinterested love of duty in general. But leaving this out of the question, a great variety of considerations make it an object of choice; and if it be pursued as a means to obtain the object in view with sufficient steadiness, and for a sufficient length of time, by degrees it is pursued as an end, and duty is then loved for itself.

In opposition to these views, as to the progress of the affections towards disinterestedness, it may be urged that children are often more disinterested than persons who have had some experience in life. Our ideas on this point we have already had occasion to state; and we wish to refer the reader to them. See *MORAL Education*, col. 43.

No one can, with justice, think less highly of the exertions of disinterestedness, because it can be shewn to arise from a meaner origin. Ought we not rather to admire the height which has been gained by a steady use of the general means of worth, and by a right employment of the discipline of Providence? Is his conduct less lovely, who has gone through the trial, and brought from it disinterestedness which prompts to efforts of the noblest kind for the good of others? The opinion that the mind is originally disinterested, may be pleasing in some points of view; but in

others it is the contrary: it diminishes the value of the character where it exists, for constitutional disinterestedness could have no more merit than the possession of good sight; and it damps the efforts of the mind to acquire disinterestedness. Those who find themselves deficient, who discover feelings which disinterestedness cannot approve, have, on the principles which we have been aiming to illustrate, the best encouragement in their endeavours to transfer their affections from self. These principles lead, too, humbly and gratefully to acquiesce in every means which Providence may appoint to discipline the mind, and to purify it from all that can debase. In short, they point the view to the highest excellence, and direct to the means of attaining it.

(4) *Habitual Biasses*.—We now proceed to the last of those laws of association which we proposed to notice; and in what we shall advance on the subject, we shall make a free use of Mr. Stewart's Elements.

The leading feature of the operations of the associative power is, that when two or more ideas are presented to the mind together, or in close succession, they become connected with one another, or blended together; so that the one, when recalled to the view of the mind, is accompanied with the other. But we must not limit its exercise to this operation: it not only connects ideas, when they are thus presented together to the mind, but is the cause of the introduction of ideas with one another, which have never before been presented together to the mind. An object, which has never before been presented to the mind, may excite numerous ideas or trains of ideas; while another may continually occur, without exciting a single idea. And the same object will affect different persons differently, so that in the mind of one it will excite trains of thought, while in another it will only produce a momentary impression; and in different persons, too, the same object will excite different trains of thought; and in the same person, at different times, different effects will be produced. Now all this depends upon the habitual or accidental biasses to particular kinds of connections, produced either by the original tendencies of the mental constitution, or, more usually, by the particular culture of the individual's mind, owing to direct instruction, or to the effect of circumstances, operating without any intention either on his part or on that of others.

The earliest bond of union between objects of thought is their being presented to the mind together, or in close succession, through the medium of sensation. This is owing to the objects of sensation being connected in time or place; or, in other words, owing to the relation of contiguity in time and place existing between these objects. This cause of connection among our ideas is what necessarily has the earliest efficacy in forming those connections; because it does not presuppose, as every other does, the existence of other ideas in the mind, or the exercise of attention to other relations which exist among them. Children associate ideas almost entirely by this bond of union; persons of uncultivated minds, in the same manner, usually have their ideas connected by the same bond of union; contiguity of time and place of the objects of sensation producing impressions on the mind at the same time, or in close succession: and more or less it is a connecting link, or cause of connection, in every one, in every period of life.

We might, *à priori*, calculate upon its high importance in the mental structure; and as a matter of fact, it is the foundation of all experience and philosophy, and, at the same time, the source of numerous prejudices. It is the source of numerous prejudices, by leading us to expect continued conjunction in time or place, where the conjunction

was only occasional; and thus to suppose a real and permanent connection between objects, which had only accidental and temporary connection. Hence unenlightened experience of the past will fill the mind, in numberless instances, with vain expectations, or with groundless alarms, concerning the future: hence the regard which is paid to unlucky days, to unlucky colours, to the influence of the planets, &c.; apprehensions which render human life, to many, a continual series of absurd terrors. But this principle of connection among our ideas is also the foundation of all experience and philosophy; for the grand object of philosophy is the knowledge of those laws which regulate the succession of events; so that from the past we may be enabled to anticipate the probable course of the future, and to regulate our conduct accordingly: and, therefore, it is of the first importance that the connections of time and place should have a strong power over the mind. Experience is of a more limited nature, but has the same object, to anticipate the probable course of events, so as to make the past subservient to the conduct of the future; and by rendering contiguity, in time, one of the strongest principles of connection in our minds, the wise author of our frame has conjoined in our thoughts the same events which we find conjoined in our experience, and has thus accommodated, without any effort on our part, the order of our ideas to that scene in which we are destined to act.

Upon the connections established by this principle all other connections are founded. Some of the most striking are those which arise from the relations of similarity, of contrariety, of cause and effect, of means and end, of premises and conclusion.

Next to the relation of contiguity in time and place, that of similarity is most universally operative. It does not depend upon an active exertion of intellect, but arises spontaneously from the mental constitution. Similarity implies partial identity of sensation; and hence an object, when first presented to the mind, frequently recalls the idea of that which has some parts of its component sensations the same. Thus, when we see a face which considerably interests us, we are often led to recollect the face of some other person, in consequence of the impressions from each agreeing in some particulars. In the same manner, when the circumstances of one event are in some respects the same with the circumstances of another, which had before fallen under our notice, so far there is a recurrence of the same impressions, and that, by the more general law of association, recalls the remaining circumstances.

This cause of connection among our ideas, like that of contiguity of time or place, is of the greatest importance, and at the same time liable to be greatly misused. Without it, the experience of the past would be of no utility to us; for the same set of circumstances never occurs twice. If there be sufficient similarity to recall the past, it now answers the purpose of exciting the expectation of what occurred in similar circumstances, that is, of bringing the experience of the past to bear upon the present. But as similarity is only partial sameness, if it be not accompanied with some discrimination, consequences will be expected that will never happen, and conclusions, which will mislead, will be formed without any just foundation.

Ideas are connected together, not only in consequence of their similarity, that is, sameness in some of their component parts, but frequently also from similarity in the sounds expressing them. It is upon this circumstance that the art of punning is founded; an art which may be innocent in itself considered, but which, when made much an object, leads from sense to sound, and prevents us from carefully examin-

ing the arguments and differences of things, on which alone reasoning can be founded. So much indeed is a habit of punning at variance with habits of thought and sober reflection, that the whole current of thought will sometimes be diverted from its proper channel, by some word, in which the thought is expressed, recalling, by similarity of sound, some other which calls up its own train of thought. A good pun may sometimes be considered as an exercise of the judgment; but more usually it is merely an exercise of the associative power, in this particular principle of connection, similarity in sound; and, therefore, it would be wise in young persons to check the desire to obtain an acquisition, which is of little value, because almost every one may acquire it, and which must check the culture of other more valuable principles of association.

Another fertile principle of connection is *contrariety*, which connects together ideas which are totally, or in many respects, opposite to each other. This, however, is more the result of attention and habit, than those of contiguity in time or place, and similarity. Some persons are particularly disposed to it, others have little tendency to it. It frequently appears to arise from the natural tendency of the mind to change from one set of feelings, which are in some way or other displeasing, to others which may be pleasing; and very often serves to illustrate reasoning, but particularly to give interest and force to a description of natural scenery, or a delineation of character.

The other principles of connection which we mentioned are more refined, and are the result of culture. A person who has been more accustomed to philosophize, or to reason, than to follow the airy flights of wit or poetic fancy, connects his ideas by the principles of cause and effect, of means and end, of premises and conclusion. When a phenomenon is stated to his mind, it almost involuntarily brings forward ideas, which serve to account for the phenomenon: we do not mean that the mind invariably brings forward the right ideas, but simply those which answer the wants of the individual, by serving to account to him for the phenomenon. In like manner, when an end is proposed, the train of thought is concerned about the means, which are often suggested, though the object itself was never before in the view of the mind. All these relations doubtless produce their effect by minute and almost imperceptible samenesses in the particular object now in the view of the mind, and some one which before has been, and which has been connected, by some cause or other, with the cause or means by which it was produced, or to be produced; but it is convenient to speak of them as distinct from the more obvious relations, because they imply different culture of the mind, and lead to such widely different effects. Now any one of these connecting principles may, by habit, be strengthened to such a degree, as to give us a command over all the different ideas in our mind, which have the given relation to each other; so that when any one in the class occurs to us, we have almost a certainty that it will suggest the rest. As this appears to be an indisputable fact respecting the influence of association, we may state it in the following general form:—When an idea is presented to the mind, either by sensation or association, bearing certain relations, either in itself or in its effects on the mind, with another idea already in the mind, the latter is recalled by the former, and becomes connected with it; and the association, thus produced, is subject to the same laws with those which are formed, owing to the contiguity in the times of the reception of the associated ideas.

3. *Respecting the composition of Ideas.*—Another grand law, or mode of operation, of the associative power, is that

that by which simple ideas are formed into compound or complex ideas; in other words, more generally, by which simple sensorial changes are combined and blended together. In the consideration of this most important and extensive principle, we shall derive most of our statements from those of Hartley; divesting them, however, of those peculiarities of expression, which depend for their correctness upon the truth of the positions that the medullary substance of the brain is the sensorium, and that sensorial changes are *vibrations* of the medullary substance.

In order to explain this law of association, it is necessary to take a view of the modes in which simple ideas, or ideas of sensation, may be associated.

*Case 1.*—Let the sensation A be often associated with each of the sensations B, C, D, &c.; that is, at certain times with B, at certain other times with C, and so on: it is evident, from what has been before stated, that A, when produced alone, will raise *a, b, c, d, &c.* (the simple ideas of sensation corresponding respectively with A, B, C, D, &c.) altogether; and consequently will associate them together. If *a, b, c, d, &c.* are distinct in all their parts, then, in the first instance, they will be merely *connected*, so as to make a *group*, which may be represented by  $a + b + c + d, &c.$ ; but if they are not distinct in their parts, they more or less run into each other, so as to form a complex *cluster*, which may be represented by  $abcd, &c.$  Now the more frequently the group  $a + b + c + d$  occurs in connection, the more closely the single ideas are united; and unless any one has a peculiar degree of vividness, they will by degrees appear to the mind as one idea; and unless the notice of the mind is particularly directed to the circumstance that it is composed of parts, it appears as much a single idea, as originally each of the parts would have done, if the attention had been directed to them singly. And, in like manner, the more the cluster  $abcd$  occurs in combination, the more completely the parts coalesce, so that by degrees they form a complex idea, the parts of which are scarcely distinguishable.

*Case 2.*—If the sensations A, B, C, D, &c. be associated together, according to various combinations of twos, or even of threes, fours, &c., then A will raise up  $b + c + d, &c.$ ; also B will raise up  $a + c + d, &c.$ ; and compound or complex ideas will be formed of those combinations, precisely as was before stated in the case of sensations, each singly associated with another sensation. It may happen indeed, in both cases, that A may raise a particular idea, as *b*, preferably to any of the rest, in consequence of its being more frequently associated with *b*, or of the greater novelty of the impression of the corresponding sensation B rendering it more vivid, or of some peculiar tendency in the sensorium to excite *b*, or of some other cause; and in like manner that B may raise *c* or *d* preferably to the rest. However, all this will at last be over-ruled by the recurrence of the associations, so that by degrees any one of the sensations will excite the ideas of the rest at the same instant and therefore associate them together.

*Case 3.*—Let A, B, C, &c. represent successive sensations, occurring in contiguous, successive instances; A will raise *b, c, d, &c.*; B will raise *c, d, &c.*; and though the ideas do not rise precisely in the same instant, yet they come nearer and nearer together than the sensations did in their original impression; so that these ideas are at last associated synchronously, as they were from the first successively.

*Case 4.*—All compound impressions,  $A + B + C + D, &c.$ , or  $ABCD, &c.$ , (according as they are received by different organs, or the same,) after sufficient repetition, leave behind their compound ideas  $a + b + c + d, &c.$ , or

$abcd, &c.$ , which recur every now and then by means of those sensations or ideas, with which the whole compound, or any one or more of the parts A, B, C, D, &c. have been associated. Now in these recurrences of compound ideas, the parts are farther associated and more intimately united to one another, agreeably to what has been already observed, so as to form a compound or complex idea, which will appear to the mind as one single idea. As the same causes produce the recurrence of the compound ideas, in whatever way the union was first produced, the same remarks may be made under each of the cases as have been under this and the first case, respecting the causes and effects of such occurrence.

On the whole it is evident, that the simple ideas of sensation must run into clusters and combinations by association; and that each of these will, at last, coalesce into one compound or complex idea. It appears also from observation, that many of our mental or intellectual ideas, (that is those in which no particular idea of sensation is perceptible,) such as those which belong to the heads of beauty, honour, moral qualities, &c., are, in fact, thus composed of parts which by degrees coalesce into one complex idea. And as this coalescence of simple into complex ideas is thus evinced both by the principles of association and by observation, so it may be illustrated and farther confirmed, by the similar coalescence of letters into syllables and words, in which association is likewise a chief instrument.

If the number of simple ideas which compose the complex one be very great, it may happen that the complex idea shall not appear to bear any relation to its component parts, nor to the external senses by which the original sensations were received. The reason of this is, that each single idea is overpowered by the sum of all the rest, as soon as they are all intimately united together. Thus in very compound medicines, the several tastes and flavours of the separate ingredients are lost and overpowered by the complex one of the whole mass; so that it has a taste of its own, which appears to be simple and original. Thus also white appears, and is vulgarly thought to be, the simplest of all colours, while yet it really arises from a certain mixture of the seven primary colours in their due shades and proportions. And, to resume the illustration above-mentioned, to one unacquainted with the arts of reading and writing, it would not appear probable, that the great variety of complex sounds in language, are to be analysed into a few simple sounds. One may hope, therefore, that by pursuing and perfecting the doctrine of association, we may some time or other be enabled to analyse all the vast variety of complex ideas, which pass under the names of ideas of reflection, (excepting those of consciousness,) abstract ideas, desires, affections, &c. into their simple component parts, that is, into the simple ideas of sensation of which they are formed. The complex ideas here spoken of, are generally excited by words or visible objects; but they are also connected with other external impressions, and depend on them as symbols. In whatever way we consider them, the trains of them which are presented to the mind seem to depend upon the then present state of the body, the external impressions, and the remaining influence of prior impressions and associations, taken together.

As simple ideas of sensation run into complex ones by association, so complex ideas run into complex combinations, which Hartley terms *decomplex ideas*. But here the varieties of the associations, which increase with the complexity, hinder particular ones from being so close and permanent between the complex parts of decomplex ideas, as between the simple parts of complex ones."

## PHILOSOPHY.

The simple ideas of sensation are not all equally and uniformly concerned in forming complex and decomplex ideas; but, on the contrary, some occur much oftener than others; and the same holds good of complex ideas, considered as the component parts of decomplex ideas. And innumerable combinations never occur at all in real life, and consequently are never associated into complex or decomplex ideas. Just as in language, some letters, and combinations of letters, occur much more frequently than others; and some combinations never occur at all. Farther, as persons, who speak the same language, have, nevertheless, a different use and extent of words, so though mankind in all ages and nations agree, in general, in their complex and decomplex ideas, yet there are many particular differences in them, and these differences are greater or less, according to the difference or resemblance, in age, constitution, education, profession, country, period, &c., that is, in their impressions and associations.

When sensations and ideas, with their most common combinations, have been often presented to the mind, a train of them of considerable length, may, by once occurring, produce such a tendency to recurrence, that they may recur, without the previous cause, in nearly the same order and proportion as in this single occurrence. For since each of the particular sensations and ideas is familiar, little more will be wanting for their recurrency than a few connecting links; and even these may, in some instances, be supplied by former similar instances. These considerations, when duly unfolded, seem to explain the chief phenomena of memory; and it will be easily seen from them, that the memory of adults, and of proficients in any science, ought to be much more ready and certain, than that of children and novices, as it is found to be in fact.

As many words have complex ideas annexed to them, so sentences, which are collections of words, have collections of complex ideas, that is, have decomplex ideas annexed to them. And it happens in most cases, that the decomplex idea belonging to any sentence, is not compounded merely of the complex ideas belonging to the words of it, but that there are also many variations, some oppositions, and numberless additions. Thus propositions, in particular, excite, as soon as heard, the feelings of assent or dissent; which consist chiefly of additional complex ideas not included in the terms of the proposition. And it would be of the greatest use, both in the sciences and in common life, thoroughly to analyze this matter, to shew in what manner and by what steps, that is, by what impressions and associations, our assent and dissent, both in scientific and moral subjects, are formed.

4. *Respecting the VIVIDNESS of complex ideas, and the mental pleasures and pains in general*—It is reasonable to suppose, that some ideas may be as vivid as any sensation excited by the direct action of objects upon the external organs of sense. For complex ideas may consist of so many parts, and these may so alter and exalt one another, that the sensorial change, whatever that be, may be as great as can be produced by any single external impression. And we know as a matter of fact, that mental pains are sometimes so acute, as to counterbalance, and even altogether remove the attention from, the most excruciating pains, which are merely those of sensation. This process may be assisted and accelerated by the mixture of vivid sensations among the ideas, by the sensibility of the mental organs, by a predisposition to a particular class of ideas, &c.

It is on these principles, in connection with the general operation of the associative power, that we are enabled to account for the existence of intellectual or mental pleasures

and pains, that is, those in which no particular sensible pleasure or pain is perceptible, which form a distinct and most important class of feelings. The relics of sensible pleasures and pains, that is, of pleasurable or painful sensations, unite and coalesce in the same manner as other ideas; and variously connected and blended together, they constitute the whole of those internal feelings, which we term passions, affections, emotions, &c.

In almost every step of our investigations in mental philosophy, we are perplexed by the scantiness of language, and still more by the want of precision with which the words we possess are employed. It is much more easy to point out faults than to correct them; but it appears to us likely to promote the object in one department, if the two classes of ideas, the relics of sensations, *viz.* those which are pleasurable, and those which are indifferent, or, more properly, which belong to the understanding, were denominated, the latter *notions* and the former *feelings*. Popular language would, in great measure, bear us out in this appropriation; but at least in the commencement of our statements we were obliged to employ the word feelings in a more general sense, *viz.* for every sensorial change accompanied with consciousness, because we have no other word in the language comprehending ideas and sensations: henceforward, however, we wish to appropriate the word *feelings* to those complex ideas, which are either pleasurable or painful, so as to correspond with Hartley's denomination "intellectual pleasures and pains," including, as he does, the affections and passions. We must however remark, that we decidedly prefer the term *mental* to *intellectual*, when speaking of the feelings. The understanding is usually opposed to the feelings; but mental is properly opposed to corporal; and though the bodily pleasures or pains, that is, those of sensation, are in reality pleasures and pains of the mind, yet having the external organs as their sources, there is an obvious ground of distinction between them and the feelings, in which sensation has no immediate share. To these feelings the term *sensations* is too often applied. Sensations may properly enough be termed feelings; but the term *sensations* should be confined to those feelings which are produced independent of the associative power, by affections of the organs of sense.

It appears from what has been already stated, that the mental pleasures and pains may be equal to, or greater or less than, the sensible ones, according as each person unites more or fewer, more vivid or more languid ideas, in the formation of the mental pleasures or pains.

It is of the utmost consequence to religion and morality, that the mental feelings should be analyzed into their simple component parts, by reversing the steps which concur to form them. For thus we may learn how to cherish and improve good ones, and to check and root out such as are mischievous and immoral; and how to suit our manner of life, in some tolerable measure, to our intellectual and religious wants. And as this holds good in respect of persons of all ages, so it is particularly true and worthy of consideration in respect of children and youth. The word is indeed sufficiently stocked with general precepts for this purpose, founded on experience; and whoever will follow these faithfully, may expect good general success. The doctrine of association, however, when traced up to the first rudiments of understanding and affection, unfolds such a scene as cannot fail both to instruct and alarm all those who have any degree of interested concern for themselves, or benevolent concern for others.

Our original bodily structure, and the impressions and associations which affect us in passing through life, are so much

inuch alike, and yet not the same, that there must be both a great general resemblance among mankind in respect of their mental pleasures and pains, and also many particular differences.

Some degree of spirituality, that is, that state of mind in which the pleasures and pains are not sensible, is the necessary consequence of passing through life; and the sensible pleasures and pains must be transferred by association more and more every day, upon things which of themselves afford neither pleasure nor pain.

Let the letters *a, b, c, d, e*, &c. represent the sensible pleasures, and *x, y, and z*, the sensible pains, supposing them to be only three in number; and let us suppose all these, both pleasures and pains, to be equal to each other in degree. If now the ideas of these sensible pleasures and pains be associated together, according to all the possible varieties, in order to form mental pleasures and pains, it is plain that pleasure must prevail in all the combinations of seven or more letters; and also that when the several parts of these complex pleasures are sufficiently blended by association, the pains which enter into their composition will no longer be distinguished separately, but the resulting mixed and complex pleasures will appear to be pure and simple ones, equal in quantity to the excess of pleasure above pain, in each combination. Thus association would convert a state, in which pleasure and pain are both perceived by turns, into one in which pure pleasure would alone be perceived; at least would cause the beings, who were under its influence to an indefinite degree, to approach to this last state nearer than by any definite difference. Now, though the circumstances of mankind are not the same with those here supposed, yet they bear a great resemblance to them, during that part of our existence which is exposed to our observation: for our sensible pleasures are far more numerous than our sensible pains; and though the pains are in general greater than the pleasures, yet the sum total of the latter is probably greater than that of the former; whence the remainder, after the destruction of the pains by the opposite and equal pleasures, will be pure pleasure.

The mental pleasures and pains are as real as the sensible ones; being, in fact, nothing but the sensible pleasures and pains variously mixed and blended together. They are also all equally of a factitious and acquired nature; and we must, therefore, estimate all of them equally, by their magnitude, permanency, and tendency to produce others.

The sensible pleasures and pains have a greater tendency to destroy the body than the mental ones; for they are of a particular local nature, and so affect the organs which convey them; and the destruction of any one considerable part of the body is the destruction of the whole, from the sympathy of the parts. On the other hand, the mental pleasures and pains, being collected from all quarters, do not much injure any organ particularly, but rather bring on an equal gradual decay of the system. This, however, is upon the supposition that they are not excessive; for excessive desires or emotions, even if of a refined nature, have a direct tendency to injure the mental system generally, and especially to bring on that derangement of it, which is closely related to insanity, even if it do not bear the name.

These principles afford some pleasing presumptions; such as, that we have a power of suiting our frame of mind to our circumstances, of correcting what is amiss, and improving what is right: that our ultimate happiness appears to be of a spiritual, not corporeal nature; and, therefore, that death may not stop our progress, but forward us in the pursuit of our true end; that association tends to make us

all ultimately similar; so that if one be happy, all must: and, lastly, that association may also be shewn, by a direct argument, as well as by this indirect one, to contribute to introduce pure ultimate spiritual happiness in all.

5. *Of the Affections, &c.*—We have already said as much respecting the nature of the *affections, passions, emotions, and dispositions* in general, (see *MORAL Education*, col. 24.) and we should find necessary for our present purpose; and we solicit the perusal of those observations in this place. They are followed by a statement of the leading principles respecting the origin and progress of the affections, &c.; and though we adduced them, in the article referred to, with a specific reference to the processes of education, we believe they will be found to include all that it might have been desirable to introduce in the present case. The remarks and illustrations founded on those principles, which we have subjoined to them, have a more peculiar application to the immediate object of that article; but we venture to recommend the perusal of them to the student of mental philosophy, as having a close connection with his pursuit. Presuming upon our reader's reference to the account we have given of the nature of our mental feelings, and to the leading principles respecting them, we shall proceed to offer some observations respecting the division and classification of our feelings.

The latest writer on the arrangement and explanation of the feelings is Dr. Cogan, in his *Philosophical Treatise on the Passions*; and his work is the best which is accessible, to the British public at least. Of his valuable treatise we have already given an ample account under the article *PASSION*; and we here cite again particular passages that occur under that article, in order to give our readers a better opportunity of forming a competent judgment of our remarks. Dr. Cogan uses the term *passions* with much greater latitude than what we have assigned to it, in the passage above referred to; and we think he is not fortunate in so doing. This generic term, *feelings*, limited to *mental feelings*, as distinct from *sensations*, might perhaps have supplied its place, in those cases in which he has employed it in its widest acceptation. But as to the more limited sense, to which he appears to wish to confine it by his definition, it is not calculated to bring into view those extraordinary workings of the mind, to which alone we would limit the term. We agree with him, that the term *passion* should convey an idea of the *passiveness* of the mind, when under its influence, as far as it relates to that influence; but we conceive that this passiveness is not the prominent feature of a passion.

But we will quote this philosopher's explanation of passions, and also of emotions; respecting which last we have also to regret our differing considerably from him. "The term *passion*," he says, p. 6, "may with strict propriety be used, and used exclusively, to represent the *first feeling*, the *percussion* as it were, of which the mind is conscious from some impulsive cause; by which it is wholly acted upon, without any efforts of its own either to solicit or escape the impression." We should have little objection to such a limitation of the term, if we had any other to express those peculiar states of excitement to which we have applied it, and we apprehend more agreeably to its common acceptation. The fact is, that though common language supplies a considerable variety of discriminating terms for the purposes of mental philosophy, and particularly for the department of intellect, we still want several to mark the various shades and diversities of feeling, which are now, to the destruction of all accuracy, classed under one or two general heads, and distinguished only by their generic appellation. A great deal will be effected when those terms, which we already

already have, become more settled and limited in their application.

But to proceed with Dr. Cogan's explanation of the term *emotions*. "The state of absolute passiveness, in consequence of any sudden percussion of mind, is of short duration. The strong impression, or vivid sensation, immediately produces a re-action correspondent to its nature, either to appropriate and enjoy, or to avoid and repel the exciting cause. This re-action is very properly distinguished by the term *emotion*. The sensible effect produced at the first instant, by the cause of the passion, greatly agitates the frame: its influence is immediately communicated to the whole nervous system; and the commotions excited in that, indicate themselves both by attitudes and motions of the body, and particular expressions of countenance. These effects are such universal concomitants, that no very important change in the state of the mind can take place, without some visible change of a correspondent nature in the animal economy. Emotions, therefore, according to the genuine signification of the word, are principally and primitively applicable to the sensible changes and visible effects which particular passions produce upon the frame, in consequence of this re-action, or particular agitation of mind." The term, *emotions*, therefore, Dr. Cogan, though he more commonly employs it in a much less exceptionable sense, clearly regards as denoting "the external marks or visible changes produced by the impetus of the passions upon the corporeal system;" but he states that it "is sometimes expressive of lively sensations," or rather feelings, "which do not produce visible effects in any degree proportionate to their feelings;" and that it "is frequently employed to mark the first impression which particular objects make upon susceptible minds, whether they remain concealed or not." The fact appears to the writer of this article to be, that though the term may be applied to the visible effects of inward feelings, yet that this is only because they are regarded as the signs or consequences of mental emotions; and that the concomitance of the usual visible effect is so far from being essentially necessary, that in many individuals of strong feelings, placed under habitual restraint as to the expression of them, the most powerful internal emotions have little or no perceptible external effect. To entitle feelings to the appellation of *emotions*, we conceive that they must arise and proceed in the mind, without any direct exertion, (if attended with which, they have been well termed the *workings* of the mind,) and they must be accompanied with some degree of excitation. When the excitement is very powerful, and the cause painful, the emotions produced might be more appropriately termed *agitations*: we should speak of the emotions of sorrow, the agitations of despair; the emotions of maternal solicitude, the agitations of terror, &c. *Rapture* denotes a strongly excited state of mind, producing lively emotions, arising from a pleasurable cause.

The arrangement of our feelings must be in a great measure determined by the object in view. If this be, to take the feelings as they are, in their compound state, and to arrange them so as to shew their relationship and tendency to affect one another, having in view the phenomena rather than the causes of them, we should be inclined to give a decided preference to Dr. Cogan's elegant, and, in several respects, satisfactory classification: but if the object be to trace them to their sources, in order to shew how they are generated, directly or indirectly, from the relics of sensations, and how they are modified by the various combinations of them, which, as has been already observed, is of the highest moral importance, Dr. Hartley's arrangement must have

the preference, having been expressly formed with that specific view.

The outline of Dr. Cogan's arrangement (see the article *PASSION*) is thus stated by himself (p. 53.): "When the nature of the exciting cause is more accurately ascertained, it will be found to respect either the *selfish* or the *social* principle: hence arise two important distinctions, forming two different classes. In each class, the predominant idea of a *good*, and the predominant idea of an *evil*, will constitute two different orders. The leading passions and affections under each order point out the *genera*. The complicated nature of some of the passions, and other contingent circumstances, may be considered as constituting *species* and *varieties* under each characteristic *genus*." Besides the feelings which he thus arranges, (comprehending, with one remarkable exception, all which can with accuracy be termed either passions or affections,) there is a class of feelings, exerting their influence indiscriminately in passions of the most opposite characters, which with great propriety he terms *introductory emotions*: these are the feelings of *surprise*, excited by the apparent novelty of the object, or by the unexpectedness of its introduction; of *wonder*, arising from apparent intricacy or embarrassment; and of *astonishment*, arising from what is vast and incomprehensible. We agree with Dr. Cogan, that the popular, as well as philosophical use of the term *emotions*, renders it peculiarly appropriate to these feelings; and we feel it necessary to add to our account of emotions in *MORAL Education*, that the term is employed to denote similar states of excited feeling, whether or not introduced by the exercise of the affections: and this extension of the term is requisite for the employment of it in connection with some of the objects of taste, as we think it is used by Mr. Allison. At the end of the last preceding paragraph but one, we have endeavoured to express ourselves with less limitation.

Although we have already given a concise sketch of Dr. Cogan's classification under the article *PASSION*, to which head the plan upon which this Cyclopædia is conducted led us naturally to refer it, we shall here, with a view to the more convenient introduction of our remarks on this part of his system, be under a necessity of retracing part of the ground which has been occupied by a preceding article. The importance of the subject renders it needless to make an apology to our readers for a repetition, without which the discussion of this interesting branch of mental philosophy would have been partial and incomplete. The definitions, unless otherwise intimated, will, we trust, be found to be a correct representation of at least the substance of those given by Dr. Cogan.

*Class 1.*—Feelings relating to *Self-love*. *Order 1.*—Feelings excited by the idea of *good* (1) in *possession*. *Joy* is the vivid delight arising from the immediate reception of something peculiarly grateful to the mind, and usually depending upon a sudden impulse. *Gladness* is an inferior degree of joy. *Cheerfulness* is an emotion of still gentler influence, often inspired by very trivial circumstances in persons of a lively disposition, and free from anxious care. [Here, besides an employment of the term *emotion*, which very little accords with Dr. Cogan's own explanation of it, we have to observe, that *cheerfulness* is rather a *state of mind*, than an *emotion*; though it may occasionally be attended with emotions peculiar to itself, and still more frequently predisposes to pleasing emotions: it appears to us peculiarly to denote that tranquil healthful frame of mind, in which it is alive to the gentler feelings of pleasure, and is free from all tendency to gloomy or otherwise painful trains

of thoughts.] *Mirth* is a higher degree of cheerfulness, generally excited by what is facetious or ludicrous. [This feeling may in many cases have a near alliance to cheerfulness; but the wildest mirth is often found where cheerfulness is utterly unknown.] If the good be not transitory or evanescent, we remain under the influence of contentment, satisfaction, or complacency. *Contentment* expresses the acquiescence of the mind in the portion of good we possess. *Satisfaction* denotes a pleasing state of mind, exceeding that communicated by simple contentment. *Complacency* (p. 66.) is full and continued satisfaction, connected with a considerable degree of approbation, arising from the perception of some kind of excellence. Dr. Cogan's remarks here are peculiarly interesting and valuable. *Pride* is that exalted idea of our state, qualifications, or attainments, which exceeds the boundaries of justice, and induces us to look down upon inferiors with some degree of unmerited contempt. *Vanity* is that species of pride, which, while it presumes upon a degree of superiority in some particular articles, fondly courts the applause of every one within its sphere of action, seeking every occasion to display some talent or supposed excellence: (see *MORAL Education*, col. 38.) *Haughtiness* is an overt act of pride, manifested by some action or expression, indicative of unmerited contempt of others. *Arrogance* indicates itself by some particular claims to precedence, or marks of distinction and respect from those whom pride considers its inferior in station or character, or by impertinent pretensions to an equality with superiors.

"These indications of false complacency," continues Dr. Cogan, p. 72. "in their mildest influence may be placed with strict propriety among the *affections*: upon sudden occasions they rise into *emotions*; and sometimes, particularly when connected with anger, from a supposed insult or neglect, they possess every characteristic of *passion*." We notice this observation, partly as according much more with the explanation we have endeavoured to give of the last two classes of feeling, than with Dr. Cogan's own, and partly to add one farther remark on the division of our feelings. The term *affection* may be employed to denote any mental state in which the mind is *affected* with pleasure or pain by external impressions, or by its own ideas; and it may sometimes be convenient thus to employ it; but between this very wide acceptation, and that which we have already stated in *MORAL Education*, col. 24, and which we know not how to extend, without losing its peculiar import, there is a term wanting, to denote those feelings or states of mind, which (though sometimes the rudiments of emotions and passions) have a more permanent habitual character, where yet the feelings of love or hatred cannot be traced as component parts. Thus, we know not how to regard pride as an affection, unless we use the term in its widest acceptation: pride consists in too high thoughts of ourselves; and for the complex state of feeling with which such thoughts are accompanied, and which give them habitual influence among our motives to action, we want a generic appellation. Similar remarks might be made respecting the feelings of contentment, cheerfulness, sorrow, melancholy, &c. In many cases the term *disposition* would answer the purpose; but our present nomenclature is clearly inadequate to discriminate all the classes of our feelings.

I. *Order 1.* (2) Feelings relating to *Self-love*, excited by the idea of *good* in *expectancy*. *Desire* is that influential effect which the perception of good or evil produces within us, in consequence of which we seek to obtain the one and avoid the other. *Wishes* are inactive desires, in cases where

no expectations can be formed, no efforts made. A wish may refer to *past* scenes or to *impossibilities*, where desire is totally inapplicable. [Dr. Cogan's view of the *varieties* of desire is too brief for much abridgment: it includes some of the religious feelings.] *Hope* is the encouragement given to desire; the pleasing expectancy that its objects shall be obtained.

I. *Order 2.* Feelings relating to *Self-love*, which are excited by the idea of *evil*. (1) Feelings arising from actual losses and disappointments, which class under the head of sorrow. *Sorrow* expresses a mental suffering under the privation of some good which we actually possessed, or concerning which we entertained a pleasing expectation. *Grief* is sometimes considered as synonymous with sorrow; and in this case we speak of the *transport* of grief: at other times it expresses more silent, deep, and painful feelings, such as are inspired by domestic calamities. When the mind is very deeply impressed with a sense of calamity, for a continuance, and the attention cannot by any means be diverted from it, the subject is in a state of *melancholy*. Sorrow is often diversified by being blended with other feelings. Sometimes it assumes the appearance of *discontent* and *dissatisfaction*; the one, chiefly produced by an humiliating comparison of our situation with those of others; the other by a partial accomplishment of our ardent wishes. Where the disappointment is great, especially when referred to the agency of others, dissatisfaction becomes  *vexation* or *chagrin*; all implying irritation as well as sorrow. *Impatience* is also a mixture of sorrow and anger, under the immediate sensation of something irksome, or at the causes of unpleasant delay. *Repining* is sorrow united with some degree of repentment, where the mind dares not break forth into strong expressions of anger. *Patience* is a calm acquiescence in a state in which we experience uneasiness or suffering. *Resignation* adds a submissive disposition respecting the intelligent cause of our uneasiness. *Humility* is a degree of habitual sorrows, or painful apprehensions, concerning our moral or intellectual deficiencies.

We observe here the influence of too great a desire to generalise in the classification of our feelings. Humility may sometimes be nearly allied to sorrow; but it surely is not necessarily so. He who is conscious of having spared no exertions in the cultivation of his mind, may feel a tranquil humility in contemplating his own inferiority, without any discontent or sorrow; the pious mind may take delight in contemplating its infinite inferiority, to the great object of its adorations; and so on. *Humility* is the disposition which leads us to think lowly of ourselves: where it is a steady influential disposition, it is productive of tranquil emotions, sometimes even of satisfaction at the superiority of others: where it is attended with the consciousness of wrong causes of inferiority, sorrow must blend with it; but an humble sense of our own intellectual and moral qualities is so closely allied to contentment, and so effectually preserves us from the painful and uneasy emotions of pride, that humility, in its habitual character, is more nearly related to happiness than to misery. *Humiliation* seems most correctly to stand for that feeling which Dr. Cogan denominates humility. (On humility, as opposed to pride and vanity, see *PHILOSOPHY, Moral*.) In the subsequent division, Dr. Cogan speaks of his having arranged *remorse* under the head of sorrow. There is a remarkable deficiency of that and the related feelings, (at least in the second edition, to which alone we have the power of referring,) and we will endeavour to supply it. *Penitence* denotes the sorrow we feel at

the consciousness of past transgressions or neglect of duty. When the feelings of penitence possess so much influence in the mind, as to excite it to steady resolutions of amendment, and to effectual efforts after reformation, both in the affections and conduct where wrong, they may be denominated *repentance*. *Contrition* seems to express a more permanent state of sorrow at the recollection of past sins and failures, in which the mind is deeply humbled, and the spirit wounded, often giving a tinge of melancholy to the trains of thought and feeling. It does not exclude the hope of final acceptance; but it indulges not the rapture of assurance. It is closely allied to humility; and may often be considered as a mixture of humility and penitential sorrow. *Remorse* is the corroding uneasiness and distress of mind, which accompanies the recollection of glaring breaches of duty, which have been followed by irreparable injuries, especially to the welfare of others. It does not necessarily lead to repentance; where it does, the hope which this inspires, foothless and reduces the feelings to contrition.

I. *Order 2.* (2) Feelings arising from *self-love*, relating to apprehended evil. The generic feeling of this division is *fear*, produced by the immediate apprehension of some impending evil, either of loss or disappointment. *Confernation* is a strong foreboding of tremendous evils which are likely to follow misfortunes already experienced; and it chiefly refers to alarms excited by some general calamity of incalculable extent. *Abject fear* seems to be inspired chiefly by the idea of an irresistible power in its cause. *Terror* rouses to defend or escape. *Dread* is a degree of permanent fear; an habitual and painful apprehension of some remote evil. *Despair* is the permanent fear of evil, without any mixture of hope. *Remorse* (Dr. Cogan says) "has been already placed under sorrow; but whenever it is connected with a fear of punishment, it deserves a place under this passion also, which greatly increases its agonies." *Cowardice* is that habitual disposition which disqualifies for opposing dangers and difficulties. *Pufflanimity* is terrified at mere trifles, or imaginary dangers. *Timidity* is a less reproachful term, employed when there is some apology from sex, tender years, or feebleness of frame. *Doubt*, considered as a feeling, and distinct from simple deliberation, is that comfortless state which is occasioned by the uncertainty of an event, and the predominance of fearful apprehension respecting it. *Irresolution* represents the mind as fluctuating between hope and fear, in cases where it ought to determine. *Shame* is a painful sensation occasioned by the quick apprehension that reputation and character are in danger. *Modesty* may be deemed an habitual solicitude; not to offend against any species of decorum. [This solicitude is the consequence of the feelings of modesty, not modesty itself. We do not however know how to improve upon our basis.] In opposition to fear are *fortitude*, which expresses that firmness of mind which resists dangers and sufferings; *courage*, which is active fortitude; and *intrepidity*, which denotes a courage perfectly undaunted.

I\*. *Order 2.* (3) Feelings arising from the *immediate perception* of evil, relating to the conduct which appears to deserve reprehension. *Anger* is a strong passion or emotion, impressed or excited by a sense of injury received, or in contemplation. Anger in the excess of its violence is termed *rage*. *Wrath* is a violent and permanent anger. *Resentment* is a lower degree of wrath. *Indignation* is resentment, against conduct which appears peculiarly unworthy. (See also Class II. *Order 2.* (2.) *Peevishness* is a slighter degree of anger, perpetually recurring to irritable persons from trifling causes.

*Class II.* Feelings derived from the *social principle*.

*Order 1.* Those excited by *benevolence*, in which *good* is the predominant idea. (1) Respecting *good desires* and *dispositions*. *Benevolence*, or *good-will*, is the love or desire of the good of others. *General benevolence* relates to all beings rendered capable of enjoyment; *philanthropy* to the whole human race indiscriminately. *Affection*, in the most limited sense of the term, denotes the habitual attachment and benignant dispositions, which the mind experiences in connection with the domestic relations, various degrees of consanguinity, and particular friendships. *Sympathy* is an inward feeling, which harmonises with the condition and feelings of its object. *Compassion* is a benevolent sorrow, at the sufferings or approaching misery of others. *Mercy* is that dignified compassion which induces us to suppress resentment, to pardon offences, or mitigate punishment, as far as discretion may admit. *Commiseration* denotes sympathy for sorrows, for which there is no apparent remedy. *Pity* is nearly allied to commiseration and compassion; but it is more frequently applied to particular circumstances in the state of the object, rather than his immediate feelings. *Generosity* prompts us to bestow favours which may require sacrifices from us, but are not called for by any particular pretensions on the part of the object of them. *Liberality* is a species of generosity, chiefly applied to free donations, or to subduing unfavourable prepossessions respecting the opinions of another. *Charity* in its original import is synonymous with *love*; it sometimes expresses a disposition to favourable judgments of others; at other times it denotes beneficence to the poor. *Condescension* designedly waves supposed personal advantages to relieve an inferior from painful feelings.

II. *Order 1.* (2) Feelings derived from *good opinion*. *Gratitude* is a pleasant affection, excited by a lively sense of benefits received or intended, or even by the desire of being beneficial. *Thankfulness* refers to verbal expressions of gratitude; yet, "a heart full charged with thankfulness," is equally correct and expressive. *Admiration* is that act of the mind, by which we discover, approve, and enjoy some unusual species of excellence, whether intellectual or moral. [We doubt whether Dr. Cogan is borne out by the recent usage of our best writers, in this restriction of the term. He intentionally leaves the more ancient usage, which gave it nearly the latitude which its derivation allowed; and it is well to give greater precision to the use of terms; but the word appears to be justly applied to excellence of every species, even where there is no explicit reference to intellectual or moral qualities; we admire a beautiful prospect, without reference to the wisdom of him who caused its beauty. And with the *discovery* of the excellence admired, *admiration* has nothing to do. We would define it to be a lively pleasurable feeling, arising from the perception of excellence.] *Esteem* is the value we place upon some degree of worth. It is higher than simple *approbation*, which is a decision of the judgment. *Respect* is that favourable impression, which the goodness of a character has made upon the person contemplating it, united with a share of good sense. *Approbation* is the feeling attending the perception of any valuable moral quality. *Esteem* is the affection entertained towards an individual, whose character is marked by those virtuous and amiable dispositions which have no necessary connection with the higher qualities of the understanding. The judgment may approve; but its decision is not itself approbation; this is more properly the feeling consequent on the approving decision. *Respect* relates to the higher moral qualities, which indicate considerable strength of understanding. *Veneration* is a higher degree of respect, in which the mind appears to be more forcibly struck with

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wisdom, connected with the sterner virtues. *Awe* is an impression made by a lively idea of power, modified by circumstances or qualities, which suggest the idea of safety. *Reverence* relates to superiority in moral endowments, connected with awe at intellectual powers, and a consciousness of our own comparative deficiencies. The complacential feelings are liable to abuse, and give rise to *fondness*, which indicates attachment to whatever belongs to us, or is immediately connected with us, far beyond its intrinsic merit; and to *partiality*, which is an excess of personal attachment, inclining to such a favourable opinion of the motives, conduct, and general merit of its object, as is inconsistent with the justice due to others.

II. *Order 2.* Feelings excited by *displacency*, in which *evil* is the predominant idea. Dr. Cogan uses *displacency* in preference to *malevolence*, as it does not include what the latter always implies, the idea of ill-will. (1) Displacency indicated by *malevolent desires and dispositions*. "*Hatred* expresses the disposition we entertain concerning, or the manner in which we are affected by, the contemplation of what we suppose to be an evil." *Malevolence* is hatred directed towards persons, leading to wish and do them ill. *Malignancy* or *malignity* expresses a disposition which cherishes inveterate hatred, and employs every means of injury: the former seems applied to radical depravity; the latter to indications of it in temper and conduct. *Malice* expresses the dispositions of inferior minds to execute every purpose of mischief within their abilities. *Envy* is the painful sensation excited by the view of something desirable in the state and situation of another, which self-love wishes to appropriate: it entertains a degree of sorrow that the good contemplated should escape ourselves, and of anger that it should fall to the share of another. *Rancour* is a degree of malice which preys upon its possessor. *Cruelty* is the disposition which delights in the contemplation or infliction of absolute misery. *Censoriousness* is a disposition to find fault with the conduct, sentiments, or motives of others. *Prejudice*, when used alone, denotes the disposition to prejudge the character, conduct, or motives of another, to his disadvantage, without having the proper evidence before us. *Dislike* is a species of hatred directed of all ill-will towards the object of it, and of every wish for his unhappiness. *Ingratitude* is an insensibility to benefits received, arising from stupidity, culpable inattention, or pride. *Apathy* is a stagnation of the social feelings. A second species of malevolence relates to those occasional and more transient fits of ill-will, which are excited by particular provocations, and which are not totally repugnant to the benevolent affections. These are indicated by anger, and its various modifications. (See Class I. *Order 2*, (3), for *Anger*, *Rage*, *Wrath*, and *Resentment*.) *Revenge* is an insatiable desire, prompting to sacrifice every consideration of pity and humanity to the principle of vindictive justice, deriving pleasure from the infliction and contemplation of the misery of its object. *Suspicion* is a comfortless state of doubt respecting the conduct and character of another. *Jealousy* is a painful apprehension of rivalry in cases that are peculiarly interesting to us.

II. *Order 2.* (2) Displacency indicated by *unfavourable opinions* of conduct and disposition. *Horror* is that very strong and painful feeling, which is excited by the view or contemplation of something peculiarly atrocious in the conduct of another. It may also be excited by the extremes of agony, mental or corporeal. *Indignation* expresses a strong and elevated disapprobation of mind, which is inspired by something flagitious in the conduct of another. *Contempt* is a more calm and deliberate affection of the mind, whose objects are meanness of character, perverseness of con-

duct, and radical imbecility, where it ought not to exist. *Disdain* is such a degree of contempt as precludes any commerce with the party despised. *Irrision* expresses the feeling inspired by any peculiarity of sentiment, disposition, or conduct, which we deem an offence against some acknowledged law of congruity or propriety, but which is not of sufficient magnitude to excite anger, or any of its ramifications. Its objects are the whimsical and absurd.

In various parts of Dr. Cogan's analytical survey, of which we have now given the outline, he introduces moral and philosophical remarks of a highly interesting nature, respecting the effects produced on the corporeal and mental system, by the various feelings which he describes; and the second part of his work consists of observations on the laws of excitement, the causes which create a diversity in our affections, and the influence of the passions. The whole deserves the attention of every philosophical inquirer, and will be found of great moral service to the reflecting mind. "It may with justice be advanced," says Dr. Cogan, (Pref. p. iv.) "that the history of ourselves, in this department, is of much greater utility than abstruse speculations concerning the metaphysical nature of the human soul, or even the most accurate knowledge of its intellectual powers: for it is according as the passions and affections are excited, and directed towards the objects investigated by our intellectual natures, that we become useful to ourselves or others; that we rise into respectability, or sink into contempt; that we diffuse or enjoy happiness, diffuse or suffer misery."

Though Dr. Cogan's arrangement is in many respects satisfactory, two leading objections lie against it, which we shall notice, with a view to those who may follow him in his track. The first is, that there is no distinct appropriate class for those feelings which respect the *religious* principle. We are the more surprised at this, since the writings of Dr. Cogan clearly designate him as a religious philosopher. If it were desirable to discriminate feelings of the same general nature, according as they respect the selfish or the social principle, the very peculiar effect produced upon them, by the direction of them to the Supreme Being, entitled them, when so directed, to a separate division. The consequence has been, that the religious feelings, as such, are but very cursorily considered: some are omitted, such as *faith* and *trust*; and at least one is introduced in an unhappy situation, we mean that of *resignation*, which can scarcely be said to operate upon the principle of self-love. This, however, is a defect which may be easily supplied; but the radical inconvenience of the arrangement arises from the primary divisions, which cause the separation of feelings generically the same, or the repetition of them, under each class. There is no broadly marked distinction in many of the feelings, in consequence of their respecting the selfish or the social principle. The feelings of sorrow, for instance, do not *essentially* differ in their character, whether the cause of grief be wholly personal, or be such as to excite deep but disinterested sympathy. It would, we are satisfied, have been but to drop the primary division, and to consider each class of feelings under its various modifications; under each species pointing out the characteristic differences produced by the change of objects, whether personal, social, or religious. The selfish and the social principles so continually run into each other, that every attempt to found a distinct classification upon them, however beautiful the arrangement may appear in theory, must be attended with great embarrassment in the application of it.

Hartley's arrangement is two-fold: first, the passions or affections in general; and, secondly, the passions and affections, as excited by different classes of mental pleasures and pains.

pains. He appears to use the terms passions and affections as synonymous; and he employs them with a latitude which we cannot consider as by any means expedient. Respecting the latter object, we shall have an opportunity of speaking under the different classes. We shall here briefly state his arrangement of the general passions and affections.

As all the passions arise from pleasure and pain, Hartley observes, the first and most general distribution is into love and hatred; *i. e.* we may term all those affections of the pleasurable kind, which objects and incidents raise in us, *love*; and all those of the painful kind, *hatred*. When these are excited to a certain degree, they put us upon a variety of actions, and may be termed *desire* and *aversion*; understanding by this last word an active hatred. *Hope* and *fear* are the attendants upon desire and aversion. These affect us more or less, according to the more or less frequent recurrence of the pleasing and painful ideas, the greater or less probability of the expected event, the greater or less distance of time, &c.; the power of association displaying itself every where in the agitations of mind excited by these passions. *Joy* and *grief* are love and hatred exerted towards an object which is present. After these are over, and the object withdrawn, there generally remains a *pleasing* or *displeasing recollection*, which recurs with every recurrence of the idea of the object, or of the associated ideas, and keeps up the love or hatred. In like manner, the five grateful passions, love, desire, hope, joy, and pleasing recollection, all enhance one another; as do the five ungrateful ones, hatred, aversion, fear, grief, and displeasing recollection. And the whole ten, taken together, Hartley considers as comprehending all the general passions of human nature.

6. *Of the Will.*—The will is that state of mind which is immediately previous to, and causes those express acts of memory, imagination, judgment, and bodily motion, which are termed voluntary. This is nearly Hartley's account of it in his Introduction; and it is the least exceptionable we know of. He afterwards says (prop. 89.) "the will appears to be nothing but a desire or aversion sufficiently strong to produce an action that is not automatic, primarily or secondarily. At least it appears to me that the substitutions of these words for the word *will*, may be justified by the common usage of language. The will is, therefore, that desire or aversion which is strongest for the then present time." As he considers all love and hatred, all desire and aversion as generated by association, he of course refers the will to the same origin.

The subject is truly difficult; and is not a little perplexed by the various theories which have been invented respecting the voluntary powers: and Hartley appears to us far from successful. Indeed it would probably have been best to leave the matter entirely to every one's own consciousness, with his first account of it. The will certainly assumes different complexions, according to the nature of the motives influencing it; sometimes it is a simple determination of the understanding, at other times it is the result of the affections, passions, &c. The causes influencing the will, with the variations in their influence, the connection of it with action, mental or corporeal, its influence over the trains of thought and feeling, &c. open a wide field for investigation equally interesting and important: and we regret that circumstances do not permit us to enter upon it. And to this suggestion to the inquirer, we wish to add another: Whether the feeling termed *desire* is generated by association from the relics of sensation. We have sometimes thought it necessary to admit a simple elementary principle in the human mind such, that if its intellectual faculties could be fully developed without experiencing any pleasures or pains, a case which

is of course utterly impossible as man is constituted, the communication of pleasurable feeling would immediately excite desire. But, upon more mature reflection, we are decidedly inclined to believe, that, aided by the exercise of the understanding, the operation of the associative power on the relics of sensations, is fully adequate to the production of *desire*. Our doubts have been similar, and also our present views, respecting *belief*. We would attempt an analysis of these principles of our mental constitution, but find our materials as yet too imperfect; and we refer to the subject chiefly to excite to it the attention of those who take an interest in such speculations. When Newton made his immortal discoveries respecting the grand physical principle of nature, it must have appeared to his immediate successors that there was little more to be done in natural philosophy, so far as respects the direct phenomena of attraction; those who know any thing of the progress of astronomy since that period, and particularly of the extent of the application of the law of gravitation to the apparent irregularities of the planetary motions, must perceive that the field opened by Newton affords abundant room for the exercise of the most vigorous intellect: and in the infinitely varied and complicated phenomena of mind (important as is the discovery of the grand law occasioning or affecting them all, and extensive as is Hartley's application of it), there is still scope for the unremitting exertion of the highest powers of the understanding, to observe, to analyse, and to explain them. But we will proceed from what we think he has not fully investigated to his *practical* observations, in which his principles always shine resplendent. We shall here extract, without alteration, the remarks of that nature from his 89th proposition. The reader, who is unacquainted with his Observations, will perceive in them the usual characteristics of his style; great simplicity seldom rising above neatness, and seldom failing to reach it, and perspicuity scarcely ever interrupted, except by that compression and profundity of thought which require a constant effort of close attention till the mind is familiarized to his investigations.

"Since the things which we pursue do, when obtained, generally afford pleasure, and those which we fly from affect us with pain, if they overtake us, it follows that the gratification of the will is generally attended or associated with pleasure, the disappointment of it with pain. Hence a mere associated pleasure is transferred upon the gratification of the will; a mere associated pain upon the disappointment of it. And if the will was always gratified, this mere associated pleasure would, according to the present frame of our natures, absorb as it were all our other pleasures; and thus, by drying up the source from whence it sprung, be itself dried up at last: and the first disappointments, after a long course of gratification, would be intolerable. Both which things are sufficiently observable, in an inferior degree, in children that are much indulged, and in adults, after a series of successful events. Gratifications of the will without the consequent expected pleasure, and disappointments of it without the consequent expected pain, are particularly useful to us here. And it is by this, amongst other means, that the human will is brought to a conformity with the divine; which is the only radical cure for all our evils and disappointments, and the only earnest and medium for obtaining lasting happiness.

"We often desire and pursue things which give pain rather than pleasure. Here, it is to be supposed, that at first they afforded pleasure, and that they now give pain on account of a change in our nature and circumstances. Now, as the continuance to desire and pursue such objects, not-

withstanding

withstanding the pain arising from them, is the effect of the power of association, so the same power will at last reverse its own steps, and free us from such hurtful desires and pursuits. The recurrency of pain will at last render the object undesirable and hateful. And the experience of this painful process, in a few particular instances, will at last, as in other cases of the same kind, beget a habit of ceasing to pursue things, which we perceive by a few trials, or by rational arguments, to be hurtful to us upon the whole.

“A state of desire ought to be pleasant at first from the near relation of desire to love, and of love to pleasure and happiness. But in the course of a long pursuit, so many fears and disappointments, apparent or real, in respect of the subordinate means, and so many agitations of mind passing the limits of pleasure, intervene, as greatly to check a state of desire with misery. For the same reasons, states of aversion are checkered with hope and comfort.”

For some extracts from Dr. Reid on the will, see Div. VIII. § 2. of this article, near the end.

We shall only add here, as a farther suggestion for the inquirer, that rudiments of mental desire are to be sought in the uneasy sensations attending the mere corporeal appetites when not supplied soon enough, the pleasure arising from their gratification, and the association early formed between those pleasures and the means of gratification: they must, therefore, be sought for in the infant at the breast; but in observing for this purpose, we must carefully distinguish between mere mechanical motion, and that in which the percipient principle is concerned.

7. *Of the Classes of Intellectual Pleasures and Pains, with some Account of their Origin.*—The intellectual pleasures and pains are arranged by Hartley in six classes. Perhaps the arrangement, and certainly the appellations, of the classes, are not unexceptionable; but so much light is thrown upon this part of our mental structure by the analysis of them given by Hartley, and it is so much easier to find fault than to improve, that we shall probably do best by taking the arrangement, and, with a few passing remarks, the appellations, as we find them, and by laying before our readers such a specimen of his analytical investigations as may lay a solid foundation for correct notions on this important point, and lead them to seek for further information in his Observations. The intellectual pleasures and pains are; 1. Those of *imagination*, arising from natural or artificial beauty or deformity. 2. Those of *ambition*, arising from the opinions of others concerning us. 3. Those of *self-interest*, arising from the possession or want of the means of happiness and security from, or subjection to, the hazards of misery. 4. Those of *sympathy*, arising from the pleasures and pains of others. 5. Those of *theopathy*, arising from the consideration of the attributes of the Deity, and the relation in which we stand to him. And 6. Those of the *moral sense*, arising from the contemplation of moral beauty and deformity.

In p. 89, Hartley seems to consider the above as the order in which the intellectual pleasures and pains are generated: if so, he is certainly in an error. The elementary principles of sympathy have an earlier origin than those of imagination or ambition; and those of the moral sense than the theopathic feelings. Taking the classes each as a whole, he is probably right; but their reciprocal influences on each other begin too early to allow of any nice distinction between them. Indeed the mental feelings generally run into and modify one another so much that they baffle all minute accuracy in arrangement. Even in the departments of natural history and physical science this is the case; and the difficulty might, *a priori*, be expected to be much greater in the classification of our mental phenomena.

In connection with the pleasures of imagination, we wish to mention Mr. Allison's *Essays on the Nature and Principles of Taste*, as a work of very great merit, which, while it can scarcely fail to be highly interesting to all who are habituated to think on what passes within them, furnishes ample illustration of the principle of association. It may not, perhaps, be erroneous to say, that if he had considered that principle in all its bearings, he would occasionally have written differently; but he has done so much, that the Hartleyan must view him as a fellow-labourer. We do not recollect that he, any where, refers to Hartley; *perhaps* (but we think not) he may view his investigations in the same light with his friend Mr. Stewart; but we do not hesitate in believing, that both he and Mr. Stewart owe much more to Hartley than the latter would be willing to allow. We must also refer our readers, in this connection, to the second part of Mr. Stewart's *Philosophical Essays*; and to various parts of the 5th chapter of his *Elements*.

(1) *Of the Pleasures and Pains of Imagination.*—This class of feelings may be distinguished into seven kinds, the pleasures arising from the *beauty of the natural world*; from the *works of art*; from the liberal arts of music, painting, and poetry; from the *sciences*; from the *beauty of the person*; from *wit and humour*; and the *pains* which arise from gross *absurdity, inconsistency, or deformity*. As the pleasures of the first class admit of the most simple analysis, we shall select this as a specimen.

The pleasant tastes and smells, and the fine colours of fruits and flowers, the melody of birds, and the grateful warmth or coolness of the air in the proper seasons, transfer the reliefs of these pleasures upon rural scenes, which rise up instantaneously so mixed with each other, and with such as will immediately be enumerated, as to be separately indiscernible. If there be any object in the scene calculated to excite fear and horror, the nascent ideas of these magnify and enliven all the other ideas, and by degrees pass into pleasures, by suggesting the security from pain. In like manner the grandeur of some scenes, and the novelty of others, by exciting surprise and wonder, that is, by making a great difference in the preceding and subsequent states of mind, so as to border upon, or even enter into, the limits of pain, may greatly enhance the pleasure.

Uniformity and variety, in conjunction, are also principal sources of the pleasures of beauty, being made so partly by their association with the beauties of nature, partly by that with the works of art, and with the many conveniences which we derive from the uniformity and variety of the works of nature and of art; they must therefore transfer part of the lustre borrowed from the works of art, and from the conveniences they afford, upon the works of nature. Poetry and painting are much employed in setting forth the beauties of the natural world, at the same time that they afford us a high degree of pleasure from other sources; hence they blend some or other of the reliefs of those other pleasures with those of natural beauty. The many amusements which are peculiar to the country, and whose ideas and pleasures are revived in a faint degree by the view of rural scenes, and so mixed together as to be separately indiscernible, further augment the pleasures suggested by the beauties of nature. To these we may add the opposition between the offensiveness, dangers, and corruption of populous cities, and the health, tranquillity, and innocence, which the actual view, or the mental contemplation of rural scenes introduces; and the pleasures of sociality and affection which have many connections with them; and those pleasures which the opinions and encomiums of others respecting natural beauties produce in us, in this, as in other cases, by means

of the contagiousness observable in mental as well as in bodily dispositions. It is also to be remarked that green, which is the most agreeable to the organ of sight, is the most general colour of the vegetable kingdom, that is, of external nature; but at the same time with so many varieties, that it loses little or none of its effect in producing pleasure, which it would do if it were all of the same tint. Those persons who have already formed high ideas of the power, knowledge, and goodness of the Author of nature, with suitable affections, generally feel the exalted pleasures of devotion upon every view and contemplation of his works, either in an explicit and distinct manner, or in a more secret and implicit one; hence part of the general indeterminate pleasures here considered, is deducible from the pleasures of theopathy.

The above may be considered as the principal sources of the beauties of nature to mankind in general. Inquisitive and philosophical persons have some others arising from their peculiar knowledge and study of natural history, astronomy, and philosophy in general; for the profusion of beauties, uses, fitnesses, elegance in minute things, and magnificence in great ones, exceed all bounds of imagination; and new scenes, and those of unbounded extent, separately considered, ever present themselves to view, the more any one studies and contemplates the works of God.

Upon the whole the reader may see that there are sufficient sources for all those pleasures of imagination which the beauties of nature excite in different persons; and that the differences which are, in this respect, found in different persons, are sufficiently analogous to the differences of their situations in life, and of the consequent associations formed in them. Those who are closely attentive to what passes within them, may also, when contemplating the beauties of nature, frequently discern the relics of many of the particular pleasures here enumerated while they recur in a separate state, and before they coalesce with the general indeterminate aggregate; and this verifies the account here given. It is also a confirmation of it, that an attentive person may observe great differences in the kind and degree of the relish which he has for the beauties of nature in different periods of his life; especially as the kind and degree will be found to agree in the main with the foregoing account. To the same purpose it may be observed, that these pleasures do not cloy very soon, but are of a lasting nature when compared with the sensible ones; since this follows naturally from the great variety of their sources, and the evanescent nature of their constituent parts.

(2) *Of the Pleasures and Pains of Ambition.*—The opinions of others concerning us, when expressed by corresponding words or actions, are principal sources of happiness or misery. The pleasures of this kind are usually referred to the head of honour, the pains to that of shame. We are here to enquire by what associations it is brought about that men are solicitous to have certain particulars concerning themselves made known to the circle of their friends and acquaintance, or to the world in general; and certain others concealed from them; and also why all indications that these kinds of particulars are made known, so as to produce approbation, esteem, praise, &c. or dislike, censure, contempt, &c. occasion such exquisite pleasures as those of honour, or such intense pains as those of shame. These particulars may be classed under four heads: *external* advantages or disadvantages; *bodily* perfections or imperfections; *intellectual* accomplishments or defects; *moral* ones, that is, virtue or vice. We shall, as before, select the analysis of one of these classes of the feelings of ambition.

The intellectual accomplishments and defects which occa-

sion the feelings of ambition, are sagacity, memory, invention, wit and learning; and their opposites, folly, dulness, and ignorance. Now it is evident that independent of the intrinsic value of the former class, and disadvantage of the other, the circumstance of their being made known to others, respectively produces certain privileges and pleasures, or subjects to inconveniences and pains. It follows, therefore, that every discovery of this kind to others, also every mark or associate of such discovery, will, by association, raise up the relics of those privileges and pleasures, or inconveniences and pains respectively; and these being gradually blended together, and united with those with which each repetition of the producing cause is accompanied, afford in each instance a peculiar compound pleasure or pain, which, by the custom of our language, has the word *honour* or *shame* respectively connected with it.

This general account will apply to each of the four classes of the feelings of ambition; but the feelings of honour or shame connected with this particular class, require a more minute analysis. A great part, perhaps the greatest, is derived from the high strained encomiums, applauses, and flatteries, paid to talents and learning, and the outrageous ridicule and contempt thrown upon folly and ignorance, in all the discourses and writings of men of genius and literature; these persons being extremely partial to their own excellencies, and carrying the opinion of the world along with them by the force of their abilities and eloquence. It is also to be observed, that, in the education of young persons, and especially of boys and young men, great rewards are conferred, in consequence of intellectual abilities and attainments, and great punishments follow negligence and ignorance; which rewards and punishments being respectively associated with the words expressing praise and censure, and with all their other circumstances, transfer upon praise or censure compound vivid relics of those pleasures and pains.

In like manner all the kinds of honour and shame, by being expressed in words and symbols which are nearly related to each other, enhance each other; thus, for instance, the caresses which are given to a child, when he is dressed in fine clothes, prepare him to be much more affected with the caresses and encomiums bestowed upon him when he has been diligent in getting his lesson; and, indeed, it ought to be remarked, that the words and phrases of the parents, governors, superiors, and attendants, have so great an influence over children, when they first come to the use of language, as instantly to generate an implicit belief, a strong desire, or a high degree of pleasure. Unless very improper treatment has been practised, they have at that early period no suspicions, jealousies, recollections or expectations of being deceived or disappointed; and therefore a set of words expressing pleasure of any kind which they have experienced, put together in almost any manner, will raise up in them a pleasurable state, and the opposite words a painful one. Whence it is easy to see, that the language expressing praise or blame must instantly, from the mere associations connected with the separate words, put them into a state of hope and joy, or of fear and sorrow. And when the foundation is thus laid, praise and blame will keep their influences, from the advantages or disadvantages attending them, though the separate words should lose their particular influences, as they manifestly do in our progress through life.

The honour and shame arising from intellectual accomplishments, do often, in learned men, after a time, destroy in a great measure their sensibility in respect of every other kind of honour and shame; which seems chiefly to arise from their conversing much with books and learned men,

men, so as to have a great part of the pleasures which they receive from such intercourse closely connected with the encomiums on abilities and learning, and to hear all terms of honour applied to them, and the keenest reproach and the most insolent contempt cast upon the contrary defects. And as the pleasures which raillery, ridicule, and satire afford to the by-standers, are very considerable, so the person who is the object of them, and who begins to be in pain upon the first slight marks of contempt, has this pain much enhanced by the contrast, the exquisiteness of his uneasiness and confusion rising in proportion to the degree of mirth and insolent laughter in the by-standers; so that it happens that very few persons have courage to stand the force of ridicule, but rather subject themselves to considerable bodily pains, to losses, and to the anxiety of a guilty mind, than appear foolish, absurd, singular, or contemptible to the world, or even to persons of whose judgment and abilities they have a low opinion.

(3) *Of the Pleasures and Pains of Self-interest.*—Self-interest may be distinguished into three kinds; *gross* self-interest, or the pursuit of the means whereby the pleasures of sensation, imagination, and ambition are to be obtained, and their pains avoided; *refined* self-interest, or the explicit, deliberate, seeking for ourselves of the pleasures of sympathy, theopathy, and the moral sense, and a like explicit endeavour to avoid their pains; and *rational* self-interest, or the explicit pursuit of our greatest happiness, without any partiality to any particular kind, or direct or indirect means of happiness.

The love of money may be considered as the chief species of gross self-interest, and in an eminent manner assists in unfolding the mutual influences of our pleasures and pains, with the factitious nature of our intellectual ones, and the doctrine of association in general, as well as the particular progress, windings, and endless redoublings of self-love. For it is evident at first sight, that money cannot naturally and originally be the object of our faculties; no child can be supposed to be born with a love of it; yet we see that some small degrees of this love rise early in infancy; that it generally increases during youth and manhood; and that at last in some old persons it so ingrosses and absorbs all their passions and pursuits, as that from being considered as the representative standard and means of obtaining the commodities which occur in real life, it shall be esteemed the adequate symbol and means of happiness in general, and the thing itself, the sum total of all which is desirable in life. But we have already said so much on the origin and progress of this affection, (see Div. IV. 2. (3)), that we shall here only attend to the checks which, in the course of life, usually prevent the love of money from acquiring that power, which, without such restraint, would overcome all the particular desires on which it is founded.

First, then, it is checked by the strong desires of young persons, and others after particular gratifications; for these desires, by overpowering their acquired aversion to part with money, weaken it gradually, and consequently weaken the pleasure of keeping it and the desire of obtaining it; all which are closely connected together in this view; notwithstanding that the last, *viz.* the desire of obtaining, and consequently (in an inverted order) the pleasure of keeping, and the aversion to part with, are, in another view, strengthened by the desires of particular pleasures to be purchased by money. And this contrariety of our associations is not only a means of limiting certain passions, but it may be considered as a mark set upon them by the Author of nature, to shew that they ought to be limited even in this life, and that they must ultimately be annihilated every

one in its proper order. Secondly, the insignificance of riches in warding off death and diseases, and, in many cases, shame and contempt also, and in obtaining the pleasures of religion and the moral sense, and even those of sympathy, ambition, imagination, and sensation, first lessen their value in the estimation of those who reflect, and afterwards assign to them a very low rank among the means of happiness. Thirdly, the eager pursuit of any apprehended source of happiness, such as fame, learning, &c. leaves little room in the mind for avarice or any other foreign end.

These considerations not only account for the limitation set to the love of money, but for the various apparent inconsistencies and peculiarities observable in it in different individuals. Thus profuseness, with respect to sensual and selfish pleasures, is often joined with avarice; covetous persons are often rigidly just in paying, as well as exacting, and are sometimes generous where money is not immediately and apparently concerned; they have also moderate passions in other respects, and for the most part are suspicious, timorous, and complaisant; and the most truly generous, charitable, and even pious persons are highly frugal, so as to put on the appearance of covetousness, and even sometimes and in some things to border upon it. We also see why the love of money must in general grow stronger with age, and especially if the particular gratifications, to which the person was most inclined, become insipid or unattainable; why frequent reflections upon money in possession, and the actual viewing of large sums, strengthen the associations by which covetousness is generated; and why children, persons in low life, and indeed most others, are differently affected towards the same sum of money in different forms, gold, silver, notes, &c.

The love of money is universally deemed a more selfish passion than the pursuit of the pleasures of imagination, honour, or sympathy; yet all are generated by association from sensible pleasures, having their origin in self; all in their several degrees tend to private happiness, and all are in certain cases pursued coolly and deliberately from the prospect of obtaining private happiness by them. The reasons why the love of money has in so peculiar and decided a manner the shame of selfishness connected with it, appear to be as follow. The pleasures which it produces are nearly, and in general completely, of a solitary nature, and shun participation. As far as money is deemed a means to the accomplishment of some useful purpose, it ceases to be desired on its own account, and then its pleasing associations are communicable; but the love of money, as an end, is exclusive to the individual possessor. And in addition to this it is obvious, that in general it is not only confined to the individual, but prevents others from receiving the advantage which it might procure to them. The pleasures of sympathy, on the other hand, consist in doing good to others; those of ambition are scarcely attainable in any other way; and those of imagination are not only capable of a very extensive communication, but are most perfectly when enjoyed in company. Farther, a regard to self frequently recurring must denote a pleasure selfish; so that if any, even of the most generous pleasures, and such as at first sight have no immediate relation to self-interest, be pursued in a cool deliberate way, not from the mere impulse of present inclination, but from the opinion that it will afford pleasure; they must be referred to self-interest. Now money has scarcely any other relation to pleasure, than as an evident means; so that after it has acquired the power of pleasing instantaneously, the intermediate steps and associations must frequently appear; and hence it forces on the mind a more constant reference to its tendency to promote the

the happiness of the individual possessor. The other pleasures have in general a far greater share of indirect associations with previous pleasures; and acquire the power of gratifying, not so much from being the manifest causes of other gratifications, as their most common adjuncts; whereas money is generally the most visible of all causes.

Honour, power, learning, and many other things, are however pursued in part after the same manner, and for the same reasons as riches; namely, from a tacit supposition, that the acquisition of every degree of these is treasuring up a proportional degree of happiness, to be produced and enjoyed at pleasure. And the desires of each of these would, in like manner, increase perpetually during life, did they not curb one another by many mutual inconsistencies, or were not all damped by the frequent experience and recollection, that all the means of happiness cease to be so, when the body or mind cease to be disposed in a manner proper for their reception. It is also worthy of observation that riches, honours, power, learning, and all other things which are considered as means of happiness, become means to each other in a great variety of ways; thus transferring upon each other all the associated pleasures, which they collect from other quarters, and approaching nearer and nearer perpetually to a perfect similarity and sameness with each other, in the instantaneous pleasures which they afford when pursued and obtained as ends. It appears likewise, that all aggregates of pleasure thus collected by them all, must, from the structure of our frame, and of the world which surrounds us, be made at last to centre and rest upon him who is the inexhaustible fountain of all power, knowledge, goodness, majesty, glory, property, &c.; so that even avarice and ambition are, in their respective ways, carrying on his benevolent and all-wise designs. And the same thing may be hoped of every other passion and pursuit; one may hope that they all agree and unite in leading to ultimate happiness and perfection. However, they differ greatly in their present consequences, and in their future ones, reaching to certain intervals of time indefinite and unknown to us, and thus becoming good or evil, both naturally and morally, in respect of us and our limited apprehensions, judgments, and anticipations. And yet one may humbly hope that every thing must be ultimately good, both naturally and morally.

(4) *Of the Pleasures and Pains of Sympathy.*—The sympathetic affections, or those by which we feel when others feel, may be divided into four classes; those by which we rejoice at the happiness of others, those by which we grieve for their misery, those by which we rejoice at their misery, and those by which we grieve at their happiness. Of the first kind are *sociality, good will, generosity, and gratitude*; of the second, *compassion, and mercy*; of the third, *moroseness, anger, revenge, jealousy, cruelty, and malice*; and of the fourth, *envy*. It is easy to be conceived that association should produce affections of all these four kinds; since in the intercourses of life, the pleasures and pains of one person are in various ways intermixed with, and dependent upon, those of others, so that compounds of their relics are excited in all the possible ways, in which the happiness or misery of one person can be combined with the happiness or misery of another; viz. in the four above-mentioned. We have already entered so much at length into the rise and progress of the benevolent affections, (see Div. IV. 2. § 3. and *MORAL Education*;) that we deem it most expedient to give here the analysis of the third class, those by which we rejoice at the misery of others, previously stating Hartley's application of the terms above mentioned. *Sociality* is the pleasure we take in the company and conversation of others, particularly of our friends and acquaintance. *Good-will* (or *benevolence* in its more limited

sense) is that pleasing affection which engages us to promote the welfare of others to the best of our power. *Generosity* is that modification of benevolence which disposes us to forego great pleasures, or to endure great pains for the benefit of others. *Gratitude* is that modification of benevolence which arises from the past reception of favours, leading to make every practicable return of good to our benefactor. *Compassion* is the uneasiness which a man feels at the misery of another. *Mercy* is compassion exercised towards one who has forfeited his title to happiness or the removal of misery by some demerit, particularly against ourselves. *Moroseness* is that disposition which leads us to be dissatisfied with the efforts of others for our comfort, to be displeased at their innocent enjoyments, and to feel a pleasure in imposing restraints upon their satisfaction. *Anger* is a sudden start of passion, by which men wish and endeavour harm to others. *Revenge* prompts to inflict and rejoice in evil, in return for evil real or supposed. *Malice* deliberately wishes the misery of others. *Cruelty* disposes men to take delight in inflicting pain, and in contemplating misery. *Jealousy* arises from the suspicion of a rival in the affections of a person of the other sex. *Envy* is the disposition by which we consider the good things possessed by others as a diminution of our own happiness, and grieve at their enjoyment of them.

*Moroseness, peevishness, severity, &c.* are most apt to arise in those persons who have some real or imagined superiority over others, which either magnifies their failures of duty, or at least renders the individual very attentive to such failures. Bodily infirmities and frequent disappointments, by making the common intercourses of life insipid, and enhancing small injuries; delicacy and effeminacy, by increasing the sensibility both of body and of mind with respect to pain and uneasiness; luxury, by producing unnatural cravings, which clash not only with the like cravings of others, but also with the common course and conveniences of life; and, in short, all kinds of selfishness have the same effect upon the temper. The severe scrutiny which persons sincerely penitent for past departures from duty make into their own life, and the rigid censures which they pass on their own actions, are often found in proud and passionate tempers to raise such indignation against vice, as breaks out in an undue severity of language and behaviour with respect to others; and this especially if they seem to themselves to have overcome all great vices, and are not yet arrived at a due sense of the many latent defects still remaining in them. And this is much increased by all opinions which represent the Supreme Being as implacable towards a part of his creatures, and this part as reprobate towards him. By all which we may see, that every thing which makes disagreeable impressions on our minds, at the same time that our fellow creatures are present with us in sensation or in idea, and especially if these be connected by the relation of cause and effect, &c. will in fact produce in us moroseness or peevishness. This follows from the doctrine of association, and is also an evident fact. It is likewise a strong argument for cheerfulness and the pleasures of innocent moderate mirth.

*Anger* and *revenge* may be analysed as follows. The appearance, idea, approach, actual attack, &c. of any thing from which a child has received harm, must, by the law of association, raise in his mind the relic of that harm. The same harm often arises from different causes, and different harms from the same causes; these harms and causes have an affinity with each other, and thus they are variously mixed and blended together, so that a general confused idea of harm, with the uneasy state of the nervous system, and the consequent activity of the parts, are raised up in young children upon certain appearances and circumstances. By

degrees the denials of gratifications, and many intellectual aggregates, with all the signs and tokens of them, raise up a like uneasiness by the law of association; and thus it happens, that when any harm has been received, any gratification denied, or other mental uneasiness occasioned, a long train of associated relics of painful impressions enhance the displeasing feeling, and continue it much beyond its natural state. This is the nascent state of the passion of anger, in which it is nearly allied to fear, being the continuance of the same internal feelings quickened on the one hand by the actual painful or uneasy impression, but, on the other, moderated by the absence of the apprehension of future danger. By degrees the child learns, from observation and imitation, to use various muscular exertions, words, gestures, &c. in order to ward off or remove the causes of uneasiness or pain, and so goes on multiplying perpetually, by further and further associations, both the occasions of anger and the expressions of it; and, in particular, associates the desire of hurting another, with the apprehension or actual receiving of harm from that other. As persons grow up to adult age, and distinguish living creatures from things inanimate, rational and moral agents from irrational ones, they learn to refer effects to their more ultimate causes; and thus their resentment passes from the inanimate instrument to the living agent, especially if this latter be rational and moral. When the moral ideas of just and unjust, right and wrong, merit and demerit, have been acquired and applied to the actions and circumstances of human life, in the manner to be hereafter described, the internal feelings of this class have great influence in increasing or moderating our resentment.

*Cruelty and malice* are the genuine and necessary effects of anger indulged and gratified. They are most apt to rise in proud, selfish, and timorous persons, those who conceive highly of their own merits, and of the consequent injustice of all offences against them, and who have an exquisite feeling and apprehension in respect of private gratifications and uneasinesses. The low and unhappy condition of those around him, gives a dignity to a man's own; and the infliction of punishment, or mere suffering, strikes a terror, and so affords security and authority. Add to these, the pleasures arising from gratifying the will, and perhaps some from mere curiosity, and from the rousing an obdurate callous mind to a state of sensibility. Thus we may perceive how nearly one ill passion is related to another; and that it is possible for men to arrive at last at some degree of pure cruelty and malice.

(5) *Of the Pleasures and Pains of Theopathy.*—In order to form just ideas respecting the origin and nature of the theopathic affections, it will be desirable to shew what associations are formed with the word *God*, and with the equivalent and related terms and phrases. Many of the actions and attributes of men are in common language applied to *God*; and it is probable that children, in their first attempts to decypher the meaning of the word, suppose it to stand for a man whom they have not seen; and their visible conceptions connected with the term, will, therefore, be that of a human form. When they hear or read that *God* resides in heaven, (that is, according to their conceptions, among the stars,) that he made all things, that he sees, hears, knows, and can do all things, vivid ideas which surprise and agitate the mind are raised up in it; and if they have made some progress in intellect, they will feel great perplexity in their endeavours to realize such ideas to themselves; and this perplexity will add to the vividness of the ideas, and altogether will transfer to the term *God* and its equivalent, such secondary ideas as may be referred to the heads of magnificence, astonishment, and reverence. When children hear that *God* has no visi-

ble shape, that he cannot be seen, &c., it adds much to their perplexity and astonishment, and at the same time destroys many of their former ideas; still, however, some visible ideas of the heavens, the throne of *God*, &c. seem to remain. When a child hears that *God* is the rewarder of good actions, and the punisher of evil actions, and that the most exquisite future happiness or misery, described under a great variety of particular emblems, are prepared by him for the good or bad respectively, he feels strong hopes or fears rising alternately in his mind, according to the judgment which he passes upon his own actions, founded partly upon the previous judgment of others, and partly upon an imperfect moral sense or conscience begun to be produced in his mind. At different periods of this progress, those ideas which have arisen from his filial relation, unite and blend with all the ideas previously connected with the term *God*, in consequence of the frequent application of the term *Father* to the *Supreme Being*; and there cannot be a reasonable doubt, that the notions and feelings which he has formed towards his earthly parents at first form a considerable share in, and for a long period afterwards tend to modify, those belonging to the term *God*. On the whole, therefore, it is probable, that among Jews and Christians, children begin with a definite visible conception attached to the word; that this is by degrees obliterated without any thing of a stable precise nature succeeding in its room; and that by further degrees, a great variety of strong mental affections recur in their turns when they think of *God*.

The affections exerted towards *God* may be classed under two general heads, *love* and *fear*: to the former may be referred *gratitude*, *confidence*, and *resignation*, also *enthusiasm*, which may be considered as a degeneration of it; to the latter, *reverence*, which is a mixture of love and fear, also *superstition* and *atheism*, which are degenerations of it.

The *love* of *God*, with its related affections, is generated by the contemplation of his bounty and benignity, as these appear from the view of the natural world, the declarations of scripture, or a man's own observation and experience respecting the events of life. It is supported and much increased by the consciousness of upright intentions and sincere endeavours, with the consequent hope of future reward; and by prayer, vocal and mental, public and private, inasmuch as this gives a reality and force to all the ideas before spoken of. Frequent conversation and reading, in which the devout affections are excited, have great efficacy also from the infectious nature of our dispositions, and from the perpetual recurrence of the appropriate words, and of their secondary ideas, first in a faint state, afterwards in a stronger and stronger perpetually. The contemplation of the rest of the divine attributes, his omnipotence, omniscience, eternity, omnipresence, &c. have also a tendency to support and augment the love of *God*, when this is so far advanced as to be superior to the fear: till then, these wonderful attributes enhance the fear so much, as for a time to check the rise and growth of the love. Even the fear itself very much contributes to the generation and augmentation of the love, and in a manner greatly analogous to the production of other pleasures from pains. And indeed it seems that, notwithstanding the variety of the ideas and feelings which contribute to this affection, there is so great a resemblance among them, that they melt languish by frequent recurrence, till ideas of an opposite nature, by intervening at certain seasons, give them fresh life.

On this theory, the love of *God* is evidently deduced in part from directly interested motives, viz. from the hopes of a future reward: and partly from motives or sources of it, in which direct explicit self-interest does not appear, but

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which may be traced up to it ultimately. However, after all the sources of this affection have coalesced together, it becomes as disinterested as any other. It appears also that this pure disinterested love of God may, by a concurrence of a sufficient number of sufficiently strong associations, arise to such a height as to prevail over any other of the desires, interested or disinterested.

*Enthusiasm* may be defined, a mistaken persuasion in any person that he is a peculiar favourite with God, and that he receives supernatural marks thereof. The vividness of the ideas of this class easily generates this false persuasion in persons of strong imaginations, religious ignorance, and narrow understandings, especially where the moral sense is but imperfectly formed, by giving a reality and certainty to all the reveries of a man's own mind, and confirming the associations in a preternatural manner. It may also be easily contracted by contagion, as daily experience shews; and indeed more easily than most other dispositions, from the lively language used by enthusiasts, and from the great flattery and support which enthusiasm gives to pride and self-conceit.

The *fear of God* arises from a view of the evils of life, the threatenings of the scriptures, the sense of guilt, the infinity of the divine attributes, and from prayer, meditation, and conversation, and reading on such subjects. When confined within proper limits, it is *awe, veneration, and reverence*; when excessive, or not duly regarded, it degenerates either into *superstition* or *atheism*. *Superstition* may be defined a mistaken opinion concerning the severity and punishments of God, magnifying them with respect to ourselves or others. *Atheism* is either *speculative*, which denies the existence of a God; or *practical*, which is the neglect of him, where a person thinks of him seldom, or with reluctance, and pays little or no regard to him in actions, though he does not deny him in words. Both kinds in Christian countries seem to proceed from an explicit or implicit sense of guilt, and consequent fear of God, sufficient to generate an aversion to the thoughts of him, and to the methods by which the love might be generated, and yet too feeble to restrain from guilt; and it is the tendency of all pain to prevent the recurrence of the circumstances which produced it. On the religious affection in their early stages, see *MORAL Education*, IV.

(6) *Of the Pleasures and Pains of the moral Sense.*—There are certain dispositions of mind, with the actions flowing from them, which when a person believes himself to be possessed of, and reflects upon, a pleasing consciousness and self-approbation rise up in his mind, exclusively of any direct explicit consideration of advantage likely to ensue to himself from the possession of those dispositions: in like manner, the view of them in other persons raises up a disinterested love and esteem for those persons. And the opposite qualities and actions are attended with the condemnation both of ourselves and others. This is in general the state of the case, but there are many particular differences, according to the particular education, disposition, professions, sex, &c. of each person. The general agreement and particular differences in our ideas of right and wrong, and consequent approbation and disapprobation, seem to admit of an analysis and explanation from the following particulars.

First: Children are for the most part instructed in the difference and opposition of virtue and vice, and have some general descriptions of the virtues and vices with which they are particularly concerned. They are told that the first are good, pleasant, noble, beautiful, fit, worthy of praise and reward, &c.; the last odious, painful, shameful, worthy of blame, punishment, &c. So that the painful and displeas-

ing associations, previously annexed to those words in their minds, are, by means of that confidence which they place in their parents and instructors, transferred to the virtues and vices respectively. And the mutual intercourses of life have the same effect, in a less degree, with respect to adults, and those children who receive little or no instruction from others directly. Virtue is in general approved, and set off with all the encomiums and honourable appellations which any other thing admits of; and vice loaded with censure and reproaches of all kinds, in all good conversation and books. And this happens oftener than the contrary, even in bad ones: so that as far as men are influenced in their judgments by those of others, the balance is on the whole on the side of virtue.

Secondly: There are many immediate good consequences which attend upon virtue, and many ill consequences upon vice; and this during the whole progress of our lives. Sensuality and intemperance subject men to diseases and pain, to shame and anxiety: temperance is attended with ease of body, freedom of spirits, the capacity of being pleased with the objects of pleasure, the good opinion of others, the perfection of the senses, and of the mental and corporeal faculties, &c. Anger, malice, and envy, bring returns of anger, malice, and envy from others, with injuries, reproaches, fears, and perpetual disquietudes; and in like manner, good will, generosity, compassion, are rewarded with suitable returns, with the pleasures of sociality and friendship, and with high encomiums. And when a person, by the previous love of man, is qualified to worship God in any measure as he ought, this affords the sincerest joy and comfort; while, on the contrary, the neglect of God, or practical atheism, murmuring against the course of providence, fool-hardy impiety, &c. are evidently attended with great anxiety, gloominess, and distraction, as long as any traces of morality or religion are left upon the mind. Now these pleasures and pains are often recurring in various combinations, and being variously transferred upon each other, from the great affinity between the several virtues and their rewards, and the vices and their punishments, will at least produce a general mixed pleasing consciousness, when we reflect upon our own virtuous affections or actions; a sense of guilt and anxiety, when we reflect upon the contrary; and also raise in us the love and esteem of virtue, and the hatred of vice in others.

Thirdly: The many benefits which we receive immediately from the piety, benevolence, or temperance of others, or which have some obvious connection with them, and the mischiefs resulting from their vices, lead us to love or hate the persons themselves by association, and then to love and hate the virtues and vices themselves; and this without regard to our own interest, and whether we view them in ourselves or others. The love and esteem of virtue in others is much increased by the pleasing consciousness which our own practice of it affords to the mind; and, in like manner, the pleasure of this consciousness is much increased by our love of virtue in others.

Fourthly: The great suitableness of all the virtues to each other, and to the virtue, order, and perfection of the world, impress a very lovely character upon virtue; on the contrary, self-contradiction, deformity, and mischievous tendency of vice, render it odious, and the object of abhorrence to all who reflect on the subject. The terms which are employed to denote the pleasures of the imagination, are employed in connection with virtue; and all the associated feelings, attached to the terms, are consequently associated with virtue, adding greatly, therefore, to the pleasures derived from the contemplation of an act of sublime virtue.

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Fifthly: The hopes and fears of a future life are themselves pleasures and pains of a high nature. When a sufficient foundation has been laid by a practical belief of religion, by thoughts of death, by the loss of friends, by corporeal pain, by worldly disappointments and afflictions, for the formation of strong associations of the pleasures of these hopes with duty, and the pains of these fears with sin, the repetition of these associations will at least make duty itself a pleasure, and convert sin into a pain, and give lustre and deformity to all their respective appellations. And these associations will gradually become so strong, that the express recollection of the hopes and fears of another world will vanish from the view of the mind.

Sixthly: All meditations upon God, and all the expressions of the feelings of our minds towards him, by degrees transfer all the perfection, greatness, and gloriousness of his natural attributes upon his moral ones, that is, upon moral rectitude. By these means we shall learn to be merciful, holy, and perfect, because God is so; and to love mercy, holiness, and perfection, wherever we see them.

Hence it appears that all the pleasures and pains of our nature, those of sensation, imagination, ambition, self-interest, sympathy, and theopathy, as far as they are consistent with each other, with the constitution of our minds, and with the course of the world, produce in us a moral sense, and lead to the love and approbation of virtue, and to the fear and abhorrence of vice. This moral sense, therefore, carries its own authority with it, inasmuch as it is the sum total of all the rest, and the ultimate result from them. When it has advanced to considerable perfection, a person may be made to love and hate merely because he ought; that is, the pleasures of moral beauty and rectitude, and the pains of moral deformity and unfitness, may be transferred, and made to coalesce almost instantaneously. After this profound analysis of the moral sense from Hartley, it may appear like presumption to refer to *MORAL Education*, III. The view there may, however, perhaps be serviceable to some, in connection with the early cultivation of it.

8. *Intellectual Perceptions or Ideas of Consciousness.*—We have now shewn the means by which a vast variety of complex ideas, whether notions or feelings, are generated by the associative power from the simple relics of sensations, or from these variously combined; and Hartley is of opinion, that by similar means are formed all the notions and feelings of the mind. We have ourselves expressed a similar opinion in *MORAL Education*, col. 21; but there is one class of ideas which we do not feel able to refer to the operation of the associative power on the simple ideas of sensation, or any combinations of them. We reflect upon what passes within us, and we perceive not only objects of thought, but certain operations of the mind upon them by which they are variously modified. We can not only direct the mind's eye to these operations when actually taking place, but we can form recollections of them when they are at an end: we not only perceive them as they are passing, but we can recall notions of them long after they have ceased; we can reason about them, and, what is more, we can think of them, and, without their recurrence, can retrace impressions derived from attending to them when they were going on. And, in like manner, with respect to the various feelings and states of mind, we can not only direct the attention of the mind to them at the time, but we can think of them after other feelings and states of mind have been introduced; we can remember how the mind was affected by them; and can form recollections of them, which may be almost entirely destitute of the pleasure or pain which

made part of them; in other words, we can form notions of them, which can be recalled, distinct from the feelings or states of mind themselves. Sensations, and the combinations of their relics, may be properly considered as furnishing the *occasions* for these notions which the mind forms by attention to its own states and operations; but the notions could never, as far as we can perceive, have been formed without such exercise of reflection, by any operation of the associative power on ideas of sensation, or the most complex compounds of ideas derived from them. The term intellectual perception aptly expresses the power of the mind to perceive the operations of feeling and intellect; and as the term perception is in common use to express not only the power, but the result of its exercise, we might conveniently denote the notions we form of our mental states and operations, by the term *intellectual perceptions*; we think it better, however, to term them, in reference to an appropriate signification of the term consciousness, already adverted to, *ideas of consciousness*.

The readers of Locke will at once perceive that we here refer to a class of those ideas which that philosopher styles *ideas of reflection*; and we should not have departed from his nomenclature, if we had not thought it unnecessary to apply the term to many of those notions which he refers to this class of our ideas, and to avoid error from the extent already given to his term, we prefer the employment of another.

Hartley is eminently successful in the analysis of the mental *feelings*; it appears to us that he has established the derivation of them all from sensation by the agency of the associative power. Respecting this grand class of our ideas, he has left nothing for future inquirers but to pursue the method he has adopted; to trace the various modifications of feeling to their less complex feelings, and to shew how these arise from the relics of sensible pleasures and pains; to trace out the influence of external circumstances, corporeal temperament, and the operations of intellect upon them, and their mutual influence upon each other. Respecting the notions of the understanding, a great deal yet remains to be done. Hartley has given a clue to the formation of a great variety of them; and has shewn the application of his principles to a sufficient number to prove their great extent and importance; but after repeated reflection we feel compelled to admit that the ideas of the understanding which we have spoken of under this head, cannot be referred to sensations as their origin, though, without sensations, they could not have existed, since there would otherwise have been nothing to call forth the operations of the mind from attention to which those notions are derived.

These ideas of consciousness are obviously subject to the general operations of the associative power. They can be connected with other ideas, so as to be introduced among our trains of thought agreeably to the common principles of association; and combinations of these ideas can be formed, so as to produce general, or abstract, notions of various mental states or operations, including the common qualities in which they agree.

With respect to our more refined and complicated notions, there is a wide field for highly important analytical inquiry; to shew from what impressions their rudiments are formed, and by what processes they have been combined and modified. Much is done in the formation of our notions by the unintentional exercise of the associative power, and by what may be termed accidental impressions derived from external objects; but much must also be referred to the voluntary exercise of the intellect.

V. *Of the Motive Power.*—In our general view of the primary mental faculties, we stated as an obvious fact, that without

without any external excitement of the nerves by which muscular motion is produced, the mind can produce such motion, in other words, that state of the motory nerves by which muscular motion is effected can be produced by the mind. To account for this fact, we infer that the mind possesses a power or capacity of influencing the motory nerves, so as to produce muscular motion, which may be called the motive power. Even supposing that the sensorial changes by which muscular motion is followed, whatever they may be, are of the same nature with those produced by external impressions on the organs of sense, (Hartley, p. 15.),—and admitting, what appears certain, that it is owing to the associating power that ideas, and sometimes that sensations, produce motory changes of the sensorium,—still we must infer the existence of a motive power, otherwise ideas and sensations could not be the exciting cause of muscular motion: in other words, whatever be the mental causes of muscular motion, that motion, if it begin from the mind, implies that the mind possesses the power of which we speak, separate from the cause of sensations, of ideas, and of the connections among them. Indeed this appears to be generally admitted, but the operations of the motive power are usually referred to the head of will.

A great number of the phenomena of muscular motion are explicable by the laws of association, and as far as we perceive, they can only be explained by them. There are five classes of muscular motion: 1. Where it is produced by some foreign excitement of the muscular system, without the intervention of the mind, in which case it may be termed *involuntary*. 2. Where it is produced by sensations, or sensible changes, without volition, or any other associated sensation, idea, or motion, having been concerned in the connection between sensation and motion, it is termed *automatic* in the Hartleyan nomenclature. 3. Where it follows the state of mind called will directly, and without our perceiving the intervention of any other idea, or of any sensation or motion, it may be termed *voluntary* in the highest sense of this word. If the intervention of other ideas, or of sensations and motions, all of which we suppose to follow the will directly, be necessary, it is imperfectly voluntary; yet still it is termed voluntary in popular language, if it follow certainly and readily upon the intervention of a single sensation, idea, or motion, excited by the power of the will. 4. If more than one of these be required, or if the motion do not follow with certainty and facility, it is to be esteemed less and less voluntary, semi-voluntary, or scarce voluntary at all, agreeably to the circumstances. 5. Where the motion has been voluntary, but is become automatic by the influence of the associating power, it is termed by Hartley *secondarily automatic*. With the first of these classes, mental philosophy has little or nothing to do. As to the second, till more is known respecting the nature of those changes which take place in the sensorium, the mentalist can do little more than state the fact; but it must be observed, that automatic motions are not to be found pure, except in the motions of the new-born infant, or such as are excited by some violent irritation or pain. The third and fifth classes afford farther illustration of the doctrine of association; and we shall select from the Mental Principia, with some alterations, such statements as will suffice to explain the progress of muscular motion from automatic to voluntary, and from voluntary to secondarily automatic.

The most simple instance of this progress, is in the action of grasping. The fingers of young children bend upon almost every impression which is made on the palm of

the hand, thus performing the action of grasping in the original *automatic* manner. After a sufficient repetition of the motions which concur in this action, the sensorial changes preceding them are strongly associated with different ideas, the most common of which probably are those excited by the sight of a favourite plaything or other object which the child is used to grasp and hold in his hand. He ought therefore, according to the doctrine of association, to perform and repeat the action of grasping, upon having such a plaything, &c. presented to his sight: and it is a known fact that children do so. Here the action is imperfectly automatic. By pursuing the same method of association, we may see how, after a sufficient repetition of the proper associations, the sound of the words *grasp, take hold, &c.*, the sight of the nurse's hand in a state of contraction, the recollection of a hand in that state, and innumerable other associated circumstances, that is, sensations, ideas, and motions, will produce the action of grasping; till, in consequence of the action being found to answer certain purposes which are wished for, that state of mind, which we may call the will to grasp, is generated, and sufficiently associated with the action to produce the requisite muscular motions instantaneously. The action is therefore *perfectly voluntary* in this case; and by the innumerable repetitions of it in this perfectly voluntary state, it at last acquires a sufficient connection with so many sensorial changes, either sensitive, ideal, or motory, that, whether or not they are so vivid, or so accordant with the state of mind at the time, as to obtain the notice of the mind, it follows them in the same manner as originally automatic actions do the corresponding sensations, that is, it becomes *secondarily automatic*. In the same manner may all the actions performed by the hands be explained; all those which are very familiar in life, passing from the original automatic state, through the several degrees of voluntariness, till they become perfectly voluntary, and then repassing through the same stages in an inverted order, till they become secondarily automatic on many occasions, though still perfectly voluntary on some occasions, *viz.* whenever an express act of the will is concerned.

A more interesting, but much more complicated case, is that of the employment of the organs of speech, for which, however, we must refer our readers to Hartley's Observations, p. 21, or Priestley's Abridgment, p. 33; and shall merely state a case from Hartley, illustrating the transition from voluntary actions into such as are secondarily automatic.

Suppose a person who has a perfectly voluntary command over his fingers, to begin to learn to play upon the piano forte. The first step is to move his fingers from key to key with a slow motion, looking at the notes, and exerting an express act of volition in every motion. By degrees the motory changes become connected with each other, and with the impressions of the notes, by the influence of the associating power, the acts of volition becoming less and less express all the time, till at last they become evanescent and imperceptible. For an expert performer will play from notes, or from ideas of them, or from the connection of the several complex parts of the decomposed motions, some or all, and at the same time carry on a quite different train of thoughts in his mind, or even hold a conversation with another. Whence we may conclude, that the passage from the sensible, ideal, or motory changes which precede, to those motory changes which follow, is as ready and direct, as from the sensible changes to the original automatic motions corresponding to them; and, consequently,

consequently, that there is no intervention of the state of mind called will. At least, the doctrine of association favours this: and the fact shews that there is no perceptible intervention, none of which we are conscious. See also Darwin's *Zoonomia*, sect. xvii. 2.

We may hence understand in what manner the first rudiments are laid of that faculty of *imitation* which is so observable in young children. They see the actions of their own hands; they hear themselves pronounce. Hence the impressions made by themselves on their own eyes and ears become associated circumstances, and consequently must, in due time, excite to the repetition of the actions. Hence like impressions made on their eyes and ears by others will have the same effect; or, in other words, they will learn to imitate the actions which they see, and the sounds which they hear. Imitation is a great source of the exercise of the voluntary power; and makes all the several modes of walking, handling, and speaking, &c. conformable to those of the age and nation in which a person lives; and in particular to those of the persons with whom he converses. Besides the two sources of it just mentioned, it has many others; some of these are, the resemblance which children perceive between their own bodies with all the functions of them, and those of others; the pleasures they experience in and by means of all imitative motions; the directions and encouragements given them on this head; the high opinions which they form of the power and happiness of adults, and their consequent desire to resemble them in these and all their associated circumstances. Imitation begins in various kinds of voluntary actions about the same time; and increases, not only by the sources alleged, but also by the mutual influence of every instance of it over every other, so that the velocity of its growth is for some time greatly accelerated. It is of the greatest consequence to children in their attainment of accomplishments, bodily and mental. And thus every thing to which mankind have a natural tendency, is learned much sooner in society than the mere natural tendency would produce it; and many things are learned so early, and fixed so deeply, as to appear parts of our nature, though they may be mere derivatives and acquisitions.

VI. *Of the Memory.*—The memory is defined by Hartley to be that faculty by which traces of sensations and ideas recur, or are recalled, in the same order and proportion, accurately or nearly, in which they were once actually presented. The rudiments of memory are laid in the perpetual recurrency of the same impressions, or groups of impressions. These, by the operations of the retentive power, leave traces or relics; and by the operation of the associative power, these are united in the order in which they were presented to the mind. Now, the single sensible impressions, and small groups of them, being few in comparison of all the large groups, they recur the most frequently, so as sooner to produce the elements of memory.

Suppose a person to have so far advanced in life as to have acquired all these elements; that is, that he has ideas of the common appearances and occurrences of life, under a considerable variety of subordinate circumstances, which would readily recur to his mind by slight causes, he will be thus easily enabled to retrace other occurrences; for these will consist either of the old impressions variously combined, or of new ones in some way or other connected with them. This may be exemplified and explained by the circumstance, that it is difficult to remember even well known words which have no connection with each other;

and still more so words which are neither familiar, nor formed according to familiar analogies; but that, on the other hand, persons acquainted with any branch of science or of art, very easily retains facts connected with it which were previously unknown. The recollection of ideas is also greatly aided by the connection of words, both with them and with the original impressions; for words being, from the constant use of language, familiar to persons of moderate mental culture, even in various combinations, they are easily retained, and most materially assist in producing the recurrence of the corresponding ideas. And thus when a person is relating a past fact, the ideas do in some cases suggest the words, and in others, the words suggest the ideas. Hence illiterate persons, other things being equal, do not remember nearly so well as others. Hence also the importance, contrary to the views of education which a few years ago were so fashionable, of teaching the young to remember words as well as things; for in most cases, as words serve as the bond of ideas, ideas will be loose and floating in the mind unless connected with words.

The difference between ideas and sensations principally consists in the greater vividness and distinctness of the latter; but cases are known to occur, in which visual conceptions are so vivid and distinct, that they are mistaken for actual sensations. This is particularly the case when, in consequence of disease, the system is peculiarly susceptible of excitement; and sometimes when the mind is very much absorbed in contemplating its own ideas, so that the impressions from external objects produces little effect upon it. It is a fertile source of those ideas respecting apparitions which are so prevalent among persons of physical sensibility, without that culture of the intellect, which would enable them to attend to their own thoughts and manner of thinking. Such lively recollections of past impressions may, however, be usually distinguished from sensations, by allowing the attention to relax so that they may cease to be forcibly detained as objects of consciousness; when it will in general be easily perceived that the mind loses sight of them; whereas it can lose sight of impressions from external objects only by fixing the attention upon ideas, or by corporeal motions of some kind or other. These remarks might, perhaps with greater propriety, have been made under the head of imagination, because it is seldom that in such cases the vivid conceptions recur in the exact (or nearly exact) order of actual impression, which is the essential difference between the trains of imagination and those of memory: they are, however, referrible to either class of phenomena.

Ideas of recollection differ from those of imagination, principally in the readiness and strength of the associations; but partly, and in many cases almost entirely, by the connection of the former with known and allowed facts, by various methods of reasoning appropriate to the peculiar circumstances of the case, and by recollecting that we had before considered them as recollections, &c. All persons are at one time or other at a loss to know whether trains of vivid ideas, succeeding each other readily and rapidly, are ideas of recollection or of imagination, that is, mere reveries: and the more they agitate the matter in their minds the more does the reverie appear like a recollection. Persons of irritable nervous systems are more subject to such fallacies than others; and insane persons often impose upon themselves in this way, viz. by the vividness of their ideas and associations, produced by bodily causes. The same thing often happens in dreams.

The vividness and readiness of recollected trains is also

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one grand means of ascertaining the dates of facts; for as this diminishes (other things being equal) in proportion to the period which has elapsed since the reception of the ideas, and the formation of the associations, if the vigour of these be diminished, we refer them to a more remote period, in proportion to that diminution; and if by any cause it be kept up, the distance of time appears diminished. Thus it is, if any interesting event, the death of a friend, for instance, have been often recollected or related, till we come to make oral or mental calculations, it appears to have happened but yesterday, as we term it. However, from this circumstance, we are often apt to confound events, as to the order of time, referring them to more recent or remote periods, according to the strength and vigour of the ideas and associations, or the contrary. In general we judge of the period of events by associated circumstances, particularly by visible permanent memorials. And hence it happens, that illiterate persons have often great difficulty in assigning periods to events with any tolerable accuracy. Our readers, when they take such things into account, and consider how difficult it must in most cases be for illiterate persons, who have frequently changed their employments, to refer such changes to any specific dates, will not feel unwilling to admit, that the presumption formed against the reputed murderers of Mr. Steele, in consequence of their incorrect statements, as to their places of employment four years before their trial, should have weighed very little in the decision against those unhappy men.

We distinguish a new place, person, &c. from one which we remember, in a manner similar to that in which we distinguish recollected ideas, and those of imagination; by the greater vividness of the impression, and the strength and readiness of the associated circumstances. If we doubt whether we have before seen a person who is newly introduced to us, we try to recall some associated circumstance, such as the time and place where we may be supposed to have seen him; and if this prove erroneous, we immediately infer, that our doubt arises from some resemblance which he has with some one whom we then or there saw, or with some one whose face is familiar to us.

The memory of children is imperfect, because the elementary rudiments of memory are not sufficiently fixed by the retentive power, nor their usual groups sufficiently formed in the mind. They are also imperfect in the use of those words, and other symbols, which so materially aid the recollection; and in particular they are found very deficient in arranging facts in the order of time, judging most frequently from the vividness of their recollections, and not having the use of those denotements of time, on which the memory principally depends for accuracy in this branch of recollection. In old persons, whatever be the part of the system on which the retentive power depends, that power is most materially diminished, as also the sensitive power, while the associative power has, in their habitual direction of it, been strengthened in its operations. Hence new impressions can scarcely be received, and seldom are retained; while the parts which are received and retained excite old trains of associations, rather than continue those which were recently impressed. When old persons relate the incidents of their youth with great precision, it is rather owing to the recollection of many preceding recollections and relations, than to the recollection of the thing itself.

Memory depends greatly upon the state of the brain. Concussions and other disorders of the brain, excess in sensual pleasures, and the use of spirituous liquors, impair it; and it is recovered by degrees, as the causes which affected the brain are removed. In like manner, dreams which happen

in a peculiar state of the brain, *viz.* during sleep, vanish as soon as vigilance, a different state, takes place; but if they be recollected immediately upon waking, and thus connected with a state of vigilance, they may be remembered.

When a person desires to recollect a thing that has escaped him, suppose the name of a visible object, he recalls the visible idea, or some other associate, again and again by a voluntary power, and thus at last brings in the required association and idea. But if the desire be very great, it changes the state of the mental organs, and has an opposite effect; so that the desired idea does not recur till all has subsided, and perhaps not even then.

The excellence of memory consists partly in its strength and accuracy of retention, partly in the readiness of recollection. The former principally depends on the strength and accuracy of perception in attention to our sensations, and partly upon the associative faculty; the latter depends entirely upon the strength and peculiar biases of the operations of that power. The intellectual faculties depend greatly upon the memory; hence, though some persons may have strong memories with weak judgments, yet no man can have a strong judgment with a weak original power of retaining and remembering. Before we conclude our view of this faculty, we beg leave strongly to recommend to our younger readers, especially if they possess a philosophic cast of mind, an attentive perusal of the very useful and interesting chapter of Dugald Stewart on this subject, particularly those parts which relate to the improvement of the memory; and to those in particular, who are in any way concerned in the work of education, we hope we shall be excused, when we recommend the perusal of the seventh division of *Intellectual Education*, on this faculty. See *MEMORY AND MNEMONICS*.

VII. *Imagination*.—In the use which Mr. Stewart makes of the term imagination, it includes the fancy, and (as he himself states) is in no respect a distinct power, but compounded of several others. "It includes," he says, "*conception* or simple apprehension, which enables us to form a notion of those former objects of perception or of knowledge, out of which we are to make a selection; *abstraction*, which separates the selected materials from the qualities and circumstances which are connected with them in nature; and *judgment* or taste, which selects the materials and directs their combination. To these powers we may add, that peculiar habit of association to which I formerly gave the name of *fancy*; as it is this which presents to our choice all the different materials which are subservient to the efforts of imagination."—"This," he observes in another place, "is the proper sense of the word, if imagination be the power which gives birth to the productions of the poet and the painter," and we may add of genius in general. We have no objection to such an appropriation of the term. In the Hartleyan nomenclature, however, it is used indiscriminately with fancy, in the sense in which Mr. Stewart seems to employ the latter term.

The recurrence of ideas, says Hartley, especially visible and audible ones, in a vivid manner, but without any regard to the order observed in past facts, is ascribed to the power of imagination or fancy. Every succeeding thought is the result either of some new impression, or of an association with the preceding. It is impossible, indeed, to attend so minutely to the succession of our ideas, as to distinguish and to remember for a sufficient time, the very impression or association which gave rise to each thought or conception; but we can do this as far as it can be expected to be done, and in so great a variety of instances, that we have full right to infer it in all. A *reverie* differs from imagination only

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only in this, that the person being more attentive to his own thoughts, and less disturbed by external objects, more of his trains of ideas are deducible from association, and fewer from new impressions. It is to be observed, however, that in all cases of imagination and reverie, the train and complexion of the thoughts depend, in part, upon the then state of body or mind. A pleasurable or painful state of the stomach, for instance, joy or grief, will make all the thoughts tend to the same cast. "Objects and circumstances may be so disposed," says Mr. Grant, (in a very valuable paper on reverie, for which see Manchester Memoirs, vol. i. or Nicholson's Journal, vol. xv.) "as to give to reverie a pleasing or pensive, a refined or an elegant direction. I believe it is unnecessary to ask, whether the mind will not be more apt to depart from serious meditation in a gaudy chapel, than in the solemn gloom of a cathedral? It is remarked by an eminent medical writer, that light, introduced by opening the window-shutters, gave a gay cast to the ideas of a patient who laboured under reverie. The study of Tallo was a Gothic apartment, and he fancied his familiar spirit to converse with him through a window of stained glass."

It would be easy and useful to enlarge on this faculty, and particularly on the regulation of it as affecting the character and happiness; but we should probably be able to add little to what our readers have access to in Stewart's Elements, in the last chapter of which they will find an elegant, scientific, and highly important investigation of the subject. We must also refer them to the less palatable, but not less wholesome food for the understanding, in Hartley's 91st proposition, in which he examines how far the phenomena of imagination, reveries, and dreams, are agreeable to the principle of association; and also to prop. 92, where he makes the same investigation respecting "deviations from sound reason and alienations of mind." On the phantasms produced by disease, there is an interesting detail of facts in one particular case, in Nicholson's Journal, vol. xv. See IMAGINATION.

VIII. *Understanding*.—This term, in its most extensive application, clearly includes the operations of sensation and association, except those which respect the affections; but we use it here in a narrower sense, as we have already stated, in reference to those mental states or operations by which we contemplate sensations and ideas, considered as such, and the various operations of the mind, discern the relations which exist among the objects of perception and thought, pursue truth, and assent to or dissent from propositions.

1. *General Observations on the Operations of the Understanding*.—*Consciousness* we regard as the capacity of the mind, by which it is capable of being affected by sensorial changes, whether sensible, ideal, or motory. Consciousness is in fact the notice of the mind itself; and the term is, in the most appropriate sense, applied to that state with which every mental change or operation is attended, if it in any degree excites the notice of the mind. It is by consciousness alone that we have any knowledge of the other powers of the mind; and when directed to their operations, the appellation is peculiarly appropriate. When it is excited by sensible changes it is usually called *perception*; consciousness referring to the operations of the mind as such; perception to them, as produced by external objects. (See Div. 11.) We are *conscious* of ideas and sensations; we *perceive* the external objects which produce impressions on the senses.

When the notice of the mind is continued to any particular object, or to a continual succession of objects, whether or not that continuance is caused by volition, the state of mind is called *attention*. When it is brought so far under the direction of the mind, that it can be directed at will, then

it is with propriety termed *the power of attention*. See Div. VIII. 2, and *Intellectual Education*, IV.

When the attention is exclusively directed to some object of thought separate from others, or to some component part of the object separate from its other parts; then it is termed *abstraction*, by which we understand *separate attention*. See § 2, and *Intellectual Education*, V. VI.

When the attention is directed to our perceptions, (or, in other words, to the qualities, circumstances, and changes of external objects, as they affect the mind through the medium of the sensitive and associative power,) it is termed *observation*. The term is one of such familiar and generally appropriate use, that it can scarcely be misunderstood; it is never applied to attention to the ideas of absent objects of sense, but solely to attention directed to the present objects of perception, leading to thought respecting them. See *Intellectual Education*, III.

When the attention of the mind is directed to its own states, affections, and operations, it is termed *reflection*. As observation commonly implies some exercise of the reasoning faculty, so also does reflection: but simple attention to our own thoughts and feelings, and to our manner of thinking and feeling, is in the strictest sense *reflection*. The term is however used in common language much more extensively—to denote the *attentive consideration* of any subject of *thought*. It does not seem to be ever used in reference to the present objects of perception to which observation is exclusively appropriated: but the act of thinking on any intellectual object is often termed reflection. In philosophical investigations, however, it seems best to limit it, to the attentive consideration of what passes within, of the states, affections, and operations of the mind.

When the mind is employed in the consideration of any object of thought, it is said to be *thinking*. In a wide sense it includes every intellectual operation, in other words, whatever may be termed an act of the understanding, that is, every act of the mind, properly so called, except sensation and feeling. But it appears most appropriate to that state in which the mind is actively employed in the consideration of thought, whether its perceptions, notions, or feelings. The term *thought* has two significations, the *act* of thinking and the *subject* of thinking. Considered as denoting the subject of thinking, it nearly corresponds with *notion*, *opinion*, &c.

When the mind is left in its trains of thought very much to the operation of the associative power, without any direct restraint upon it from without or within, its state is termed *meditation*; which bears nearly the same relation to the understanding, that reverie does to the imagination. The term is, however, used where the mind is more actively engaged, particularly on serious subjects of thought. It does not very greatly differ in its import from *contemplation*, but this term often appears more particularly to refer to the fields of *observation*, rather than of *reflection*.

The characteristic faculty or capacity of the understanding, is the power of *comparing* the different objects of thought, and *discerning* the various *relations* which exist among them, such are those of identity, similarity, equality, proximity, continuity in time and place, difference, dissimilarity, cause and effect, &c. &c. This property of the mind is so intimately connected with every act of sensation and thought, that it might be considered as in some sense included in the powers by which we acquire sensations and ideas. But we are not aware of any sufficient advantage resulting from connecting it with them. The receiving of a sensation, and the recurrence of an idea, even when these are made the objects of an attentive consideration, do not necessarily involve in them

them any comparison with another : and this is therefore properly to be regarded as a distinct act of the mind. The paper we are writing upon is rectangular ; and if we form a conception of it, we have the same appearance as the original sensation presented : but the mind cannot, with any degree of propriety, be said to *judge*, when it merely forms that conception, or receives the corresponding sensation. As soon as our attention is directed to the form of the paper, and by comparing it with the idea annexed to the word *rectangular*, we perceive the agreement of the form with the import of the term, we form a judgment, and the operation of the mind is well called *judging*.

It was some years ago proposed by the present highly respectable professor of moral philosophy at Glasgow, to give the appellation *intellectual perception* to the *power of the mind*, by which we *perceive relations subsisting among the various objects of thought*. Whether that philosopher still retain the appellation, or the precise views which he then took of the subject, we have not had the opportunity of ascertaining ; but our present investigations lead us to regard them as very judicious. He then considered sensation, memory, and intellectual perception, as the three primary faculties of the mind : employing the appellation memory in a wider sense than is usually given to it, so as to make the association of ideas in reality a branch of memory. In this we cannot agree with him. As to the appellation, and the discrimination of the power from the other faculties of the mind, and the importance which he attached to it, we see more and more reason to adopt his views. Still we think it more convenient and accordant with the rest of our plan, to employ the more customary appellation *judgment*, as being a term of greater latitude. That it has been defined so as to baffle every effort to know from the definition what operation of the mind was intended by it, we are aware ; and also that it is often used very loosely ; but the last circumstance is in our favour : and we wish to include under it three operations of the mind ; 1st, the attention to different objects of thought, considered as different, with a view to ascertain their mutual relations or connections ; which is appropriately termed *comparison* : 2dly, the discerning of the relation which is the object of the mind ; which is an operation of the *intellectual perception* : and lastly, the consequent association of the ideas, as bearing the observed relation, which is, in the narrowest sense, the *judgment*. The first may be to a certain degree voluntary : the second depends upon the culture, extent, acuteness of the discernment, or intellectual perception, and cannot be said to be voluntary any more than our sensations are ; the last is a process which, like every other case of association, may be made more efficacious and permanent by voluntary effort, by directing the attention to it, &c. but is not in itself a voluntary operation.

We would by no means be understood as intending to assert that because the intellectual perception is to be regarded as an essential principle of the human mind, and not altogether an acquired faculty, and as involuntary in its operations, that it operates in all alike. If, owing to the influence of association, the *perceptions* of the same *external* objects greatly vary in different individuals (see *INTELLECTUAL Education*, II.), it cannot be surprising that the *intellectual perception*, or the *discernment of relations* among the objects of *thought*, should also vary greatly. We do not therefore compare it with *sensation*, in which the simple effect of external impressions is invariable, except in the degree of intensity, and cannot differ in different periods of life, or states of mind, or progress of mental culture. The perceptions of relations, even the most common, (such as those of resemblance or

difference,) vary greatly in readiness, correctness, and extent, in different individuals, and in the same individual at different periods of life. It is susceptible of great improvement by proper cultivation. It depends for its exercise upon the memory : and its vigour and correctness depend upon the degree of habitual and discriminative attention given to the various objects of thought. The more refined relations can only be discerned among the objects of thought, when the nature of the relations themselves is understood : and this often involves some extensive processes of the associative power in connection with the general cultivation of the understanding ; and the facility and correctness with which the mind discerns such relations, depends greatly upon the pursuits of the individual, and the habitual tendencies of his mind, derived from them and from the mental character generally.

The judgment clothed in words is called a *proposition*. Every proposition expresses a connection existing in the mind of the speaker between the ideas denoted by the terms of the proposition, as bearing to each other the relation declared by the proposition : but it is, we apprehend, no uncommon error to suppose that every proposition expresses a judgment, arising from a direct act of judging. Passing by those numerous cases in which the act of judging has once taken place, but is no longer necessary, there is a variety of others continually occurring, where the proposition expresses no more than that the idea denoted by the predicate makes part of the complex idea of the subject, either universally, or at that particular time. *Milk is white* is a proposition ; but if we suppose a person, who has often seen milk, to state it for the first time, we apprehend no mental process takes place to which we can justly give the appellation of judging. There is no comparison, discerning, considering, and deciding as to the coincidence of the ideas denoted by *milk* and *white* ; he merely expresses a simple fact : if he has the substance before him, he tells you what he sees ; if he thinks of it, (forms a conception of it,) he tells you what he recollects.

When a person is somewhat practised in observing what passes within him, the greatest difficulty he has to encounter is to separate the processes of language from those of simple thought ; and those who are acquainted with the writings of some of the best mental philosophers, will see abundant reason to believe, that in various instances they have either not attended to the distinction between them, or have been unsuccessful in detecting the actual procedures of the mind. The fact is, as we have before observed, thought is more or less continually accompanied with words, even where it is not communicated to others. Where the object of the mind is something of which it can form distinct or indistinct conceptions, or consists of mere feelings, words are not necessary ; but where the processes of reasoning or investigation are concerned, it is probably in the experience of all thinking persons, that these processes are constantly introducing the conceptions of *words*, either as objects of sight or of hearing. This may be peculiarly the case with those who are much employed in the communication of their thoughts ; for since it is only by clothing them in words that they can communicate them, they can scarcely fail to be more accustomed to think in words, much as they would speak in words, than he who confines his speculations to himself. At all times, however, it contributes greatly to the clearness of thought, to express it in words ; but if, as is indisputably the case, especially in mental investigations, we find words fail us, when we endeavour to communicate the nice discriminating features of thought, it must also be allowed that there are processes of thought besides those which are aided by words.

Further, we have little doubt that it will be found accordant with the experience of all who think much of what passes within them, that in the rapidity of thought, and even in drawing general conclusions from particular facts, the mind makes use of abbreviated forms of expression to itself, and that only the outlines occur of those modes of expression, which would be requisite in conveying our thoughts into the minds of others. Something analogous to this must be familiar to all who compose with great fluency, when merely writing, for their own future transcribers. To keep up in some measure with the speed of thought, they continually use abbreviations, not merely of words, but of sentences; sometimes even making a whole word stand for a train of thought, which passing with great rapidity, seems to require little time to state it in words; but when clothed in words, so as to be fit for communication, forms a series of sentences, which, even in a train of conceptions, would require that time tenfold. In rapid thought, even on the most abstract subjects, we are confident that a faint conception of some leading words, or of abbreviations of them, is often all that passes in the mind.

But to return. We were about to observe, that from the close connection between the processes of thought and those of language, important mistakes in mental philosophy have arisen; and we regard as one of them that definition of judgment, which Mr. Stewart has sanctioned in his *Outlines*, sect. 9. "Judgment is defined by the writers on logic to be an act of the mind, by which one thing is affirmed or denied of another; a definition which, although unexceptionable, is as good as the nature of the subject admits of." We see great reason, from Mr. Stewart's *Philosophical Essays*, to believe that, in the continuation of his *Philosophy of the Human Mind*, (a work which we look forward to with as much earnestness as any of his indiscriminate admirers,) he will be much more attentive to the processes of thought, as distinct from language, than his earlier researches lead us to consider him. If so, he can scarcely avoid perceiving that he has too hastily adopted some of the errors of his predecessors; and among other things he will, we doubt not, give a very different explanation of judgment from that which we have quoted. If he had said, it is that act of the mind which attends the affirming or denying one thing of another, though, from the views which we lately stated, we should consider him as making it too general, including processes of the mind which can be regarded in no light as acts of judgment, yet the leading error would have been avoided. Still it would have left us in ignorance. The question still is, what process of thought, or act of the mind, accompanies the *thoughtful* statement of a proposition?

The repetition of a short familiar proposition is a mere act of the memory. It is of course merely an association of terms; and as the impression is united with that combination of terms, that it is true, it may pass in the mind without exciting any idea of its appropriate meaning: but in general it will be found, that a notion of its import passes rapidly in the mind, along with the statement of the terms themselves. In such cases, we can do little more than detect the existence of fleeting thought. But when the proposition is not familiar to the memory or belief, or the attention is from some cause or other particularly directed to its import, then is the period to examine what is the process of the mind when using it or receiving it. Let a simple case be taken. We say, *Gold is heavy*, and the proposition is so familiar to us, that the mind is scarcely conscious of any thought going along with it; yet we are certain, if we pay the least attention to it, as an expression of a truth, that

such is the fact: for as soon as we say, *Silver is fusible*, we not only perceive that the words are not the same, but that the internal notion attending the statement is different. But if we realize the meaning of the proposition, as expressive of some process in our own mind, we find it to be, that the complex notion of gold includes in it a notion of its heaviness; and as this last is not one which can be represented to the mind as a distinct part of that complex notion as the colour of it may, we may be obliged to think of what is the *feel* of it, when we hold a piece in our hands. In this last case, (and as it appears to us, in this only,) there is an operation of the judgment, properly so called. If the proposition merely states a connection subsisting in the mind of the speaker between the ideas denoted by the terms employed, and especially if the import of the predicate forms an essential part of the complex idea denoted by the subject, we see nothing which can with strict propriety be termed an act of judging. It may indeed be convenient in popular language to give the appellation judgment to every case, in which, by an act of attention, we ascertain the connection existing in our minds between two ideas; but if the formation of that connection be simply the result of mere sensation or association, without any consideration or comparison, it cannot itself be called a judgment, considered as an operation, without making obscurity more obscure, by confounding things which are utterly distinct.

Let us take the case respecting the form of solids. The perception of a globe includes in it the notion of its real shape, though the impression upon the retina could of itself communicate no such idea. We may, if we please, call this connection of the notion of the real shape with the visual appearance a judgment; but it is in reality an effect which would be produced by the operation of the associative power, without the intervention of volition or reflection. We can think of no definition of judgment which can include this case, which will not include every operation of association. But if we attentively consider the visual appearance of an object, in order to determine its form, and compare it with that same other object whose form we have ascertained, then we clearly have an act of judging:—it may be said, and of reasoning too. We allow it. If reasoning signifies drawing conclusions from premises, every act of judging is an act of reasoning. Reasoning is expanded judging, and judging is compressed reasoning. If reasoning denote an operation of the mind, exactly corresponding with the syllogistic expression of an act of reasoning, we think there is no such operation; except when we are intentionally employing a series of *propositions*, mentally, much the same as we would in communicating our reasonings.

The real state of the case appears to us to be, that a direct exercise of the understanding is always included in the operation of judgment, properly so called. And it should be observed, that a proposition, which is merely the statement of a connection in the mind of the *speaker*, in no way the result of consideration, but necessarily arising from the influence of external impressions on the sensitive powers, or from the agency of the associative power upon the relics of these, without the intervention of the understanding, properly so called,—such a proposition may occasion in the *bearer's* mind a real judgment, and may even require it, before the truth of it can be admitted. The proposition may be merely the statement of a complex thought; but as the terms of it represent that thought in certain parts, and in succession, if the complex thought is not itself familiar to the mind of the hearer, so as to be excited at once by the proposition, he is set by it to compare, to discern, and to decide; in other words, to judge.

We perceive here a wide field for interesting investigation; not involving mere verbal distinctions, though these are often of the utmost importance to the progress of knowledge; but respecting the real procedures of the understanding in the acts of judging and reasoning; but circumstances do not permit us to enter upon it.

We feel satisfaction in perceiving, that the views to which our examination of this subject has led us, in several respects agree with those stated by Condillac, in his *Cours d'Etude Grammaire*, part i. chap. 3. We suspect, that he was led to them by the hypothesis, which he early adopted, that the judgment, the reflection, the passions, and all the faculties of the soul, are nothing but sensations under different modifications; but though the foundation is clearly erroneous, his remarks, as far as they go, are very judicious. We say as far as they go, for he does not appear to have considered any other cases, but those which respect our perceptions merely. If in the formation of these, or our complex notions of any kind, the understanding has not been concerned, we do not perceive any operation of the judgment connected with the proposition stating the fact; the exercise of the judgment, if exercised at all, precedes the affirmation or negation.

We have before said, that, in the popular sense, the term *judgment* is used more extensively than in the philosophical acceptation (as referring to a particular power or act of the mind) it can be well employed. It is often used with as much latitude as *understanding*. We speak of the solidity, the accuracy, the clearness, &c. of the judgment, or of the understanding, with little or no discrimination; but it will probably be found that the two words are often distinguished just as the words *understand* and *judge*. The understanding conveys less the idea of activity than the judgment; and refers more to the perception of truth than to the formation of right notions. We might even say, that a good understanding and sound judgment are not inseparably connected. In the wide sense of the term, judgment is applicable to every act of the mind, by which an opinion is formed, and consequently includes not only judgment, strictly so called, but extends to the whole round of associations which respect the objects of the understanding. Still, even there, the communication of the judgment by language, and the judgment itself, are two distinct operations of the mind; and should in all cases be kept distinct by the mental philosopher. In this sense, as most accordant with our then object, we employed it in *INTELLECTUAL Education*, VIII. In that division of the article, we have introduced some remarks respecting the leading excellence of the judgment, *viz.* *discrimination*, to which we beg leave to refer the reader.

Those operations of the understanding which are denominated *reasoning*, clearly are of the same nature with judgment. Where the relation or connection subsisting between two objects of thought is shewn by considering their mutual relation or connection with one or more others, there is an act of reasoning; and the term is strictly applicable wherever one truth is inferred from another. In a variety of instances it is difficult to say whether a judgment is formed by any process of reasoning or simply by intuition; but it is clear, that a variety of truths, which are intuitively evident to the cultivated mind, require distinct processes of judging in others. And on the other hand, that truths appear intuitively evident, which have in reality been the subject of previous examination, but by familiarity are become so associated with the feeling of belief, that it is difficult to suppose they have ever been otherwise.

We shall here notice one other class of the operations of

the understanding, which may with propriety be called *investigation*, that by which truth is perceived and discovered. The exercises of the understanding, when in the pursuit of truth, continually involve operations of reasoning; they depend most closely upon the discrimination of the judgment; they imply, what indeed this state always implies, the exercise of abstraction; and yet there is something beyond all this necessary. It consists in tracing out the proofs on which any position depends, in determining their respective weight as evidence in discovering the general principles agreeable to which particular phenomena have been produced, or the causes operating to produce any known effect and their respective influence. Mr. Stewart (*Outlines*, p. 58.) gives the denomination *invention* to these procedures of the understanding. "The process of the mind," he says, "in discovering media of proof for establishing the truth of doubtful propositions, and also the process by which we bring new truths to light, is properly called *invention*."

We prefer our own appellation, because it is a less suspicious one. The term *invention* seems misapplied in reference to the discovery of truth; though we willingly admit, that in various processes of investigation, the invention is frequently exercised. We do not recollect, that this philosopher has furnished, in his writings, any clue to these processes of the understanding; and we are inclined to think, that no one has thrown so much light upon the actual procedures of the mind in the discovery or ascertainment of truth, as Hartley has in his 76th, 77th, and 78th propositions, particularly the 77th. It contains a fund of profound and important observations, the value of which cannot be affected by their having among them a few opinions which must be regarded as mere speculations; they are the speculations of a master mind, intent upon inquiries of an interesting nature; and contemplating with pleasure, what he considered as important views respecting the attainment of that, which indisputably was with him the first object,—truth. One such sentence has furnished Mr. Stewart, on more than one occasion, with an appeal to common sense against Hartley, which appears to have had great share in finally closing his own mind against the reception of the leading principles of Hartley's Philosophy, and even against the admission of the real importance and profundity of many of his observations, which, we should have imagined, must have secured that great philosopher the respect of every candid investigator into the laws of the mind, whatever be the system he has adopted.

Our readers must here allow us to digress somewhat from our main object, to consider Mr. Stewart's modes of demolishing the Hartleyan philosophy. In his account of the life and writings of Dr. Reid, we perceive indications of the low estimation in which he holds the investigations of Hartley. He there classes him with Darwin; and throws out various insinuations against him as a mere theorist, who, and some others, form an exception to the progress of the philosophical world towards the inductive plan of studying human nature. And he speaks of the "*reveries* of Hartley," which, he says, have for a while been called from oblivion by the chemical discoveries which have immortalized the name of Priestley. We think it was professor Robison who spoke of Hartley as an *idiot*. Mr. Stewart is nearer the truth. There certainly are in Hartley's works some speculations, which may be termed reveries of a philosophical understanding, if we choose so to represent them; and he has blended with his grand principles, a theory respecting the physical causes of thought, which, however ingenious and plausible, affords but little insight into the phenomena of

thought. In a few instances he has expressed himself with incorrectness respecting ideas, so as to appear to refer them to the material organization, when his system clearly referred only the occasions of thought to matter, and the ideas themselves to the sentient principle in man; and he has sometimes used the term to denote *states* of mind or even *operations* of mind. We are of opinion, too, that he has in a small number of cases carried too far the application of the grand law of association; and, in particular, that he has too much neglected the re-action of the sentient principle on the mental organs; or perhaps more correctly, the effects produced on the operations of the associative power by the exercise of the understanding. Though in his leading investigations we profess ourselves his humble followers, because we deem them alike important and just, we are not insensible of the faults of his great work, and are ready to leave him wherever we see reason to believe that he leaves human nature. But after every deduction from the merits of his work, which the most rigid justice can make, we regard it as a treasure of comprehensive and judicious observations and accurate and profound investigations respecting the phenomena of the human mind, of unrivalled excellence and importance.

Dr. Johnson, we are told, valued this work next to the bible, and the writer of this article does the same. Its value cannot be fully appreciated except making it the guide in observation and reflection on human nature, similar to those which led the author to his conclusion respecting moral and mental truth; and our own admiration of it arises in proportion to our acquaintance with the processes of thought and the phenomena of affection.

"The authors (says Mr. Stewart, § 81.) who form the most conspicuous exceptions to this gradual progress, consist chiefly of men, whose errors may be easily accounted for, by the prejudices connected with their circumscribed habits of observation and inquiry;—of physiologists, accustomed to attend to that part alone of the human frame, which the knife of the anatomist can lay open; or of chemists who enter on the analysis of thought, fresh from the decompositions of the laboratory;—carrying into the theory of mind itself (what Bacon expressly calls) 'the smoke and tarnish of the furnace.'" If this observation had not been so situated that it must be inevitably referred to Hartley in connection with Priestley and Darwin, we should have believed that a philosopher who evinces so much good sense and general candour as Mr. Stewart, could not have involved him in this censure. Such particulars of his life are before the public as should have prevented it altogether. His education obviously was of that regular judicious kind, which was calculated to give a due scope to the exercise of the understanding; and his great talents very early displayed themselves. He was originally intended for the church, and he proceeded for some time in his thoughts and studies towards that object, but was prevented from entering upon it by some conscientious scruples; and he then devoted himself to the medical profession, in which he made himself eminent by his skill, integrity, and benevolence. He had been from his youth, and still continued, in the pursuit of those branches of knowledge which peculiarly tend to expand and strengthen the understanding; and lived in intimacy with some of the most learned and intelligent men of his age, such as Law, (afterwards bishop of Carlisle,) Butler, Warburton, Jortin, Hales, Smith, &c. There was in fact every thing to bring his mind into that state in which the perception of truth is most easy; for with his habits of patient persevering investigation and observation, correct and penetrating understanding, an extensive acquaintance with the most important branches of human knowledge,

he united those moral qualities, the want of which has more than any thing tended to cloud the mind, and prevent the intellectual eye from penetrating into moral truth. His thoughts were not immersed in worldly pursuits or contentions, and therefore his life was not eventful or turbulent, but placid and undisturbed by passion or violent ambition. He was free from sensuality, intemperance, pride, ostentation, envy, and every other branch of sordid self-interest; and the principles which were taught in his works were the invariable guides of his life and conduct.

At the early age of twenty-five his great work was regularly undertaken; but for some years before that period his mind had been directed to enquiries and observations, which formed the germ of his subsequent investigations. His work was not completed till about fourteen years afterwards; and after it had lain by for two or three years more, it was published in 1749, when he was little more than forty-three years of age. His mind was for many years constantly and intently engaged upon the object; but after the completion of it he did nothing more than keep up a general and vigilant attention to it, to enable him to make any alterations or modifications which might occur from his own reflections or the suggestions of his friends. It does not appear, however, that any thing material had occurred to him; for at his death, in 1757, he left behind him no additional papers or remarks whatever. He did not expect that his work would meet with any general or immediate reception in the philosophical world, or even that it would be much read or understood; but at the same time he did entertain an expectation, that at some distant period his philosophical principles would be adopted. Present appearances favour his opinion. About two or three years ago, a *fifth* edition was published of the original work; and besides them, two editions have been sold of Dr. Priestley's abridgment.

We have been led to this account of Hartley, to assist in counteracting the effect of Mr. Stewart's contemptuous expressions, and (one must say) unfounded statements and insinuations respecting that great philosopher. We have been repeatedly reminded by them of those excellent observations on *candour in controversy*, which are to be found in Mr. Stewart's *Outlines*, p. 240, two or three sentences of which we will quote, and leave to the reader's own reflection. "He who is conscious of his own inventive powers, and whose great object is to add to the stock of human knowledge, will reject unwillingly any plausible doctrine, till after the most severe examination; and will separate with patience and temper the truths it contains, from the errors that are blended with them. No opinion can be more groundless, than that a captious and disputatious temper is a mark of acuteness. On the contrary, a sound and manly understanding is in no instance more strongly displayed, than in a quick perception of important truths, when imperfectly stated and blended with error;—a perception which may not be sufficient to satisfy the judgment completely at the time, or at least to enable it to obviate the difficulties of others, but which is sufficient to prevent it from a hasty rejection of the whole from the obvious defects of some of the parts."

In a subsequent part of the account of Reid, Mr. Stewart quotes the passage from Hartley, which we referred to at the commencement of these remarks. We will quote it ourselves, and then shew in what manner it has been quoted by Mr. Stewart. After some highly important observations respecting the nature of evidence, and on the conduct of the understanding in the investigation of truth, Hartley continues, p. 350, "These speculations may seem uncouth to those who are not conversant in mathematical inquiries; but to me they appear to cast light and evidence upon the methods

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methods of pursuing knowledge in other matters, to sharpen the natural sagacity, and to furnish loci for invention. *It appears also not impossible* that future generations should put all kinds of evidences and inquiries into mathematical forms, and as it were reduce Aristotle's ten categories, and bishop Wilkins's forty summa genera, to the head of quantity alone, so as to make mathematics, and logic, natural history, and civil history, natural philosophy, and philosophy of all other kinds, coincide omni ex parte." The parts which we have put in italics are of consequence. The first shews that the author did not indulge any very sanguine expectations on this subject, and meant that it should be regarded merely as, in his estimation, judging from what he saw of the analogy between different methods of searching after truth, a thing not impossible; and the expression as it were clearly qualifies it. Both these in Mr. Stewart's quotations are omitted. In the account of Dr. Reid, p. 93, after having spoken of the undue love of simplicity which has been directed to the processes of the understanding, and adduced a specimen from Hume, he proceeds, "and Dr. Hartley, with a still more sanguine imagination, looked forward to an era, 'when future generations shall put all kinds of evidences and enquiries into mathematical forms; reducing Aristotle's ten categories,'" &c. We should have expected that this indulgence of the imagination (if such it must be termed) would have been pardoned by every one, who had ever experienced the enthusiasm arising from the belief that he had ascertained important principles of investigation, and had traced out the connection existing among the branches of human knowledge: or by any one conversant with the writings of philosophers on subjects connected with the mental investigation; for such speculations are not unfrequently to be met with among the most judicious of them. One we have just noticed in the writings of Condillac, much resembling Hartley. (*Cours d'Etude, de l'Art de Raïsonner*, ch. xi.) "Si nous pouvons découvrir toutes les vérités possibles, & nous en assurer d'une manière évidente, nous ferions une suite de propositions identiques, égales à la suite des vérités; et par conséquent nous verrions toutes les vérités se réduire à une seule."

Hartley's conjecture is obviously an insulated one; in no way necessary to, or illustrative of, his reasoning, in the proposition in which it stands. If it had been left out, it would never have been missed; and we think it highly unjust to represent it, as Mr. Stewart appears to us to have done, as a kind of criterion of the value of his observations. In the last work of the northern philosopher, p. 15, he quotes the following passage from De Gerando. "The philosophy of mind has its alchemists also; men whose studies are directed to the pursuits of one single principle, into which the whole science may be resolved; and who flatter themselves with the hope of discovering the grand secret by which the pure gold of truth may be produced at pleasure." Mr. Stewart then adds, "Among these alchemists in the science of mind, the first place is undoubtedly due to Dr. Hartley, who not only attempts to account for all the phenomena of human nature, from the single principle of *association* combined with the *hypothetical* assumption of an invisible fluid or *ether* producing vibrations in the medullary substance of the brain and nerves; but indulges his imagination in anticipating an era, "when future generations shall put all kinds of evidence and inquiries into mathematical forms; reducing Aristotle's ten categories, &c." as before. The reader will observe the same unaccountable inaccuracy in the quotation as before, which clearly gives it a different complexion from what it has in the Observations. After citing this passage,

Mr. Stewart adds, "If I had never read another sentence of this author, I should have required no further evidence of the unsoundness of his understanding." On this summary argument we shall make only one remark. If, after reading Mr. Stewart's Elements, we were to say, he teaches us that when a person is most intently engrossed in some interesting and profound investigation, so that his attention would not be distracted even by a sudden and violent noise, he is at the same time *conscious* of all the impressions which external objects make upon the organs of sense, he is at the same time *willing* all those little motions of his limbs, to which he has accustomed himself while thus engaged, we require no further evidence of the unsoundness of his understanding, we should do him great injustice, and ourselves great injury. Mr. Stewart proceeds; "It is however on such rash and unwarranted assertions as this, combined with the supposed comprehensiveness of his metaphysical views, that the peculiar merits of Hartley seem now to be chiefly rested by the more enlightened of his admirers. Most of these, at least whom I have happened to converse with, have spoken of his physiological doctrines as but of little value compared with the wonders which he has accomplished by a skilful use of the associating principle." The grounds of our admiration of Hartley we have already stated; and we can only say, that our acquaintance with Hartleyans, leads us to conclude, that we are not singular in that respect.

But Mr. Stewart advances, p. 17, one statement which is regarded by some of his followers as a total overthrow of the Hartleyan philosophy. The generalizations which he has attempted are merely *verbal*; deriving whatever speciousness they may possess, from the unprecedented latitude given to the meaning of common terms. After telling us, for example, that "all our internal feelings, excepting our sensations, may be called *ideas*," and giving to the word *association* a corresponding vagueness in its import, he seems to have flattered himself that he had resolved into one single law, all the various phenomena, both intellectual and moral, of the human mind." On this most extraordinary statement we must offer a few remarks.

(1) There is no evidence to prove that Hartley ever flattered himself with having resolved into one single law all the various phenomena both intellectual and moral of the human mind. In his Preface, to which we refer our readers, he states his views as to what he had done. "I have here put together all my separate papers on these subjects, digesting them in such order as they seemed naturally to suggest; and adding such things as were necessary to make the whole appear there complete and systematical.

"I think, however, that I cannot be called a system-maker, since I did not first form a system and then suit the facts to it, but was carried on by a train of thoughts from one thing to another, frequently without any express design, or even any previous suspicion of the consequences that might arise. If the reader will be so favourable to me as to expect nothing more than hints and conjectures in difficult and obscure matters, and a short detail of the principal reasons and evidences of those that are clear, I hope he will not be much disappointed. However, be this as it will, I have, in one part or other of these papers, alleged all that I know material in support of my system; and therefore am now desirous to recommend it to the consideration of others. I have tried to reconcile such inconsistencies real or apparent, and to cut off such repetitions and redundancies, as have arisen from my writing the separate parts of this work at different times and in different

ent situation of mind. But I have still need of great indulgence from the reader on these and other accounts." Pref. p. 14.

We have no doubt whatever, that he has furnished the grand clue to the analysis of all the mental pleasures and pains, and of the notions of the understanding, so as to prove sensations to be the elements of the whole, (though, as we have before observed, he does not appear to have attended explicitly enough to the modifications of them caused by the intentional operation of the understanding); but he never represented himself as having himself accomplished this analysis. He does not even go so far as Mr. Stewart represents him by an error in another of his quotations, p. 128. In another passage he expresses his hopes, that "by pursuing and perfecting the doctrine of association he may some time or other be enabled to analyse all that vast variety of complex ideas, which pass under the name of ideas of reflection and intellectual ideas, into their simple compounding parts; that is, into the simple ideas of sensation of which they consist." Hartley uses the pronoun *we*; and it is clear, (both from the nature of the passage, and his almost uniform use of the singular pronoun,) that he did not mean *himself*, but inquirers following the same track. It is really melancholy to observe how much Mr. Stewart has laboured to excite prepossessions against the Hartleyan system.

(2) We are not aware that Hartley himself ever thought, that the single principle of association, united with the power of sensation, was *every thing* that is necessary to account for all the phenomena of the understanding. He certainly endeavours to shew, that the associative principle has a wide and important influence in the operations of the understanding, furnishing it with all the materials for its exercise, except mere sensations, and being, in a variety of cases, concerned in those operations; but he never represents the *understanding* itself as nothing more than *association*. The very first clause of his definition of the understanding, that it is "the faculty by which we contemplate mere sensations and ideas," is sufficient (unless there were the most decisive evidence to the contrary) to shew that he did not consider them as the same. The fact is, Hartley's Observations, as might be expected from his own account of them, constitute much less a system than is generally supposed; and there is a great variety of important observations respecting the processes of the mind, which do not appear to have been designed in any way to support the doctrine of associations, though they grow out of his investigations on the subject. We do readily admit, however, that if Mr. Stewart derived his ideas of Hartley merely from the statements of some of his followers, he would not have been without justification.

(3) Hartley is charged with employing the word *association* with a vague import. This is the first time, we suppose, that the charge has been publicly made; and we deem it altogether unfounded. We do not recollect that Hartley has any where actually defined the term; but we take for granted that it is impossible for any one to attend to his tenth and twelfth propositions, without understanding the import in which he uniformly uses it without, we believe, any real variation; and we presume it will be found to be that in which we have uniformly employed it in this article, in reference to the principle or law of association in its two operations, connections and combinations. (See Div. I. IV.) That Hartley has carried the application of the term beyond Mr. Locke's use of it, is only that extension of a term which arises from increased ac-

quaintance with the phenomena to which it is applicable. If Mr. Stewart can point out any instance in which Hartley has employed the term where it is inconsistent with his own use of it in these two fundamental propositions, there he has some room to censure. "I shall not enquire at present," says Mr. Stewart (Elements, 4to. p. 134.) "into the proper English meaning of the words *conception* and *imagination*. In a study such as this, so far removed from the common purposes of speech, some latitude may perhaps be allowed in the use of words; provided only we define accurately those we employ, and adhere to our own definitions." Hartley employs his terms with a well defined real meaning, in no respect vague nor more comprehensive than his phenomena required. If he have in any instance classed among the phenomena of association any mental operation which does not belong to it, it is a fault in his philosophy, not in his term. Not less unfounded is Mr. Stewart's censure on Hartley, for giving the appellation *ideas* to all our internal feelings, excepting our sensations. Other philosophers have included in the term *sensations* as well, or, which is much worse, have termed all our internal feelings *sensations*. The question still is, has Hartley adhered to his own definitions; and we think that there are exceedingly few instances to the contrary, and these few do in no way affect the soundness of his investigations.

(4) But we are told that *his generalizations are merely verbal*, deriving whatever speciousness they may possess from the unprecedented latitude given to the meaning of common terms. We have already intimated that the fundamental principle of Dr. Reid's philosophy (if it be more than nominal) is so completely in opposition to the Hartleyan doctrine of association, that they cannot be received together. And the influence of that principle is to us clear in the singular statement which we have just quoted: though Hartley clearly uses the word *idea* without any reference to the *phantastical* theory. We will, for a moment, suppose that he had not used it at all, that he had done as we have sometimes done in this article, used the term *notions* in reference to the understanding, and *feelings* in reference to the passions and affections, &c.: so as to have divided what he includes under *ideas*, into *notions* and *feelings*. Now we appeal to the candid inquirer, whether, if he had succeeded in shewing how the associative power operates upon the relics of sensations, forming them into various groups and combinations, so as to produce complex notions and feelings; and how each sense contributes the elements for this operation of the associative powers, and what elements from each sense enter into the more refined notions and feelings; and in tracing the great influence which association has in various processes of the understanding, and in the operations referred to the head of memory and imagination; and lastly, in pointing out how the feelings, (the mental pleasures and pains,) are formed from the more or less complex combination of the elements furnished by the sensible pleasures and pains; whether, if he had succeeded in doing all this, the investigation could be justly termed a *mere verbal generalization*, deriving whatever *speciousness* it may possess from the unprecedented latitude given to the meaning of common terms? We maintain that he has eminently succeeded in all this; and that he has done more towards *explaining* the most important phenomena of thought, of feeling, and of language, than any other philosopher ancient or modern, or, we may venture to say, even than all put together, whose investigations have been completely independent of his.

Mr. Stewart may think (and his implicit admirers may think also) that he has demolished the whole fabric of the Hartleyan philosophy at a blow; but in our apprehension the only way to effect it, is by shewing either that Hartley has given an erroneous view of our mental phenomena, or that he erred in applying a universally acknowledged principle to the explanation of them. We are satisfied that his system has been subjected to much longer and closer examination than Mr. Stewart seems to have given it, without any result unfavourable to its general truth and importance; and that as long as human nature continues as it is, it must retain its truth and its fundamental importance.

We are the more confirmed in the conclusion that Mr. Stewart has not yet given the proper Hartleyan theory a due examination by the following passage, p. 129, "His ultimate aim, in this part of it, is precisely the same with that of the schoolmen, when they attempted to explain, by the hypothesis of certain *internal senses*, how the *sensible species*, received from external objects, are so refined and spiritualized as to become, first, objects of memory and imagination; and, at last, objects of pure intellect. Such reveries are certainly not entitled to a serious examination in the present age." The writer of this article may observe, on the similarity between the Hartleyan doctrine and that of the schoolmen, that it had previously struck his own mind, and convinced him that their opinions, though mixed with error, were founded on actual observation on what passed within them. Their error lay in their hypothesis respecting the *nature* of sensations. Fanciful, however, as this hypothesis is, it is in our apprehension decidedly preferable to that which supposes that the mind thinks without any object of thought.

As to the originality of Hartley's principles, it is to us of little consequence, provided they are true; but it cannot be doubted by those who were acquainted with Hartley's character, that he has told us all that led him to his principles. Mr. Stewart (p. xx.) refers to a passage from Hume, which he regards as anticipating Hartley's conclusions, by representing "the principles of union and cohesion among our simple ideas as a kind of *attraction*, of as universal application in the mental world as in the natural." But the works of Hartley manifest no acquaintance with the Treatise on Human Nature; and if he had seen it, though he might have derived from it some valuable extensions of the connective exercise of the associative power, the particular expression which Mr. Stewart quotes could have afforded no aid to him respecting the composition of ideas. Mr. Hume, however, appears to have had a glimpse of the truth respecting the formation of the most complex ideas from the simple elements of sensations. Mr. Stewart also quotes a passage from Smith's Harmonics, which clearly implies that he had some notions similar to Hartley's hypothesis of vibrations; and observes that the work was printed in 1749, but that the preface is dated 1748. Hartley's work was finished a considerable time before; and when it is recollected that Smith and Hartley were intimately acquainted with each other, it is at least probable that Smith's mind was directed to the subject by the investigations of Hartley, and that he indirectly refers to them. We should not have entered upon the subject of this passage, but from a "wonderful coincidence," noticed by Mr. Stewart, (p. 130.) "between Hartley's theory and that of Condillac concerning the transformation of sensations into ideas. Condillac's earliest work, which was published in 1746, three years before Hartley's Observations on Man, is entitled *Essai sur l'Origine des Connoissances. Ouvrage ou l'on réduit à un seul principe toute ce qui concerne l'entendement*

*humain. 'This seul principe,'* adds Mr. Stewart, "is precisely the *association of ideas*;" and he quotes an expression from the preface, which, insulated, gives some countenance to the opinion. But those who know that in that work (i. 2. § 3.) he speaks of the association of ideas, (*le liaison des idées*), as having no other cause than the attention we have given them when presented together, and that he traces, as we have elsewhere stated, every thing to *sensation*, must feel convinced that Mr. Stewart is here also in an error. We must mention, however, that he expressly disclaims all insinuation of the suspicion of plagiarism; but his mode of statement will lead others to entertain it: and we therefore farther observe, that we have no reason to suppose that Condillac's work was soon known in England; that at any rate, Hartley's work was completed two or three years before its publication in 1749; and that the investigations of Condillac are altogether of so different a character from those of Hartley, that we doubt whether the English philosopher could have derived any material aid from them in his researches. In saying this, we by no means wish to speak with disrespect of Condillac's works, of which, as far as our acquaintance with them extends, we have been led to think highly, from the good sense and perspicuity which runs through the whole. Where he theorises, we often leave him; where he gives us the result of actual attention to the operations of the mind, his observations generally are just and important.

These remarks have expanded far beyond our original intention, and we should much sooner have brought them to a close, if the statements which have led to them had proceeded from a writer of less real eminence than Mr. Stewart. Though not to be placed upon a par with several portions of his Elements, his Philosophical Essays are in many respects valuable, and generally interesting. We had not the opportunity of consulting this work, till by far the greatest part of this article was prepared for the press, or we should probably have made some use of it in a way more grateful to our feelings than we have now done. The reader will find in that work some very just animadversions on Horne Tooke's principle, that the import of a word is to be sought in its origin; and on other points connected with language, Mr. Stewart has advanced various judicious observations, which, however, must in general be familiar to those who have been accustomed to apply the principles of Hartley to the phenomena of language. And the Hartleyan can scarcely fail to feel astonishment, when he sees Mr. Stewart stating (p. 158.) in unqualified terms: "Many authors have spoken of the wonderful *mechanism of speech*; but none has hitherto attended to the far more wonderful mechanism which it puts into action behind the scene." He cannot but wonder that Mr. Stewart should have forgotten the concise, yet most comprehensive and profound observations of Hartley (see VIII. 3.); and the reader of Condillac will be compelled to suppose that the philosopher's memory was as treacherous on this point, as when he represented his views of *attention* as original, though the leading observations he makes on the subject are distinctly stated at large, in the *Essai sur l'Origine*, part 1. sect. ii. ch. 2, &c.; and in different parts of the *Art de Penser in the Cours d'Etude*.

We should feel great satisfaction, if circumstances permitted us to bring together the valuable observations on the nature of demonstrative reasoning, and on the processes of the mind in reasoning, which are to be found in different parts of Condillac's work; and in offering such remarks on them as might serve to illustrate and extend them: but it is not practicable; and we shall merely recommend his work

to the attentive study of those who wish to pursue this branch of mental science. The remainder of our article we shall employ in laying before our readers a few thoughts on some other processes of the understanding, and a view of the principles of Hartley respecting the leading phenomena of the understanding, under the head of words, and the ideas associated with them, and the nature of assent. In this view, though we shall generally use his own expressions, we shall occasionally make such alterations in them as will best adapt them to our object; and we therefore hope that no one will impute any supposed inaccuracy in our language to Hartley himself, without examining the original.

2. *Of Attention, Abstraction, and Generalization.* (See these several articles.)—By investigating the phenomena of mind, when a connection is already formed between volition and certain mental states or operations, we are repeatedly led to consider those states or operations, however passive the mind might originally have been, as totally and in their own nature voluntary. This is remarkably the case with that state of mind which is called attention. That this is in young children entirely involuntary, is certain; and those who are endeavouring to form their minds to habits of study and reflection, know from constant experience that they have it little under their command. So far from having an original power of excluding vivid ideas or sensations, to devote the attention to those which, though most certainly demanding it, do not make the same lively impression upon the mind; it is a habit which requires strict and severe discipline to produce it; it is a possession honourable and invaluable; but, like every other of importance, not the acquisition of the moment, but of a long continued course of rigorous, and in many cases of painful, exertion. And when the habit of voluntary attention is formed, that is, when we can produce the state of mind called attention by a determination of the will, how much may fairly be attributed to the nature of the object, which, though perhaps at first uninteresting, becomes pleasing and impressive, and thus produces that state by the original laws of our constitution. It even appears probable, that the person who has formed such habits of attention to a particular science, as to be able to give it his undivided attention, would be almost as incapable of directing it to frivolous objects, or to a science to which habitual attention, or the nature of the subject, does not give any charms, as he was when he first entered upon his pursuits. In a word, when we take into consideration that our attention is never undivided, except to those things which are calculated to engage it, either by the original agreeableness of their nature, or that which they acquire in proportion as our habits become confirmed, and that the associative faculty may, and in many instances does, form a connection between the mental states we call attention and volition, we have probably then sufficient data to account for the phenomena of attention, without calling in, with Mr. Stewart, the aid of a new faculty. See *INTELLECTUAL Education*, IV.

*Abstraction* is defined by Mr. Stewart, the faculty by which the mind separates the combinations which are presented to it. This definition, so far as it goes, appears to be very correct; but if the processes of generalization are intended to be contained in it, it is by no means sufficient, as will immediately appear from the slightest consideration of that mental process. Abstraction, in this acceptance of the term, is indeed essentially subservient to every act of classification, but by no means comprehends that act in the number of its functions. Though we cannot agree with Mr. Stewart in all his statements, in his chapter on attention, we must in one position which he advances, (if by at-

tion he means the full devotement of the observation or reflection to an object,) viz. that the mind “cannot attend at one and the same instant to objects which we can attend to separately.” And if this be the case, what is abstraction but attention directed to particular objects, owing either to something vivid in the sensation they excite, or to the frequency of their recurrence; in fact, subject to all the laws of attention, perfectly involuntary in early life, and afterwards becoming to a certain degree voluntary, by means of the acquired power of the will.

In speaking of the process of generalization, some observations will apply to the process of abstraction separately considered. (See also *INTELLECTUAL Education*, V, VI.) We shall, therefore, proceed to consider the formation of general or abstract notions; a process in which the mind is most usually passive; which is capable of satisfactory explanation upon the principles of the associative power, and cannot (as we conceive) be explained without it.

Sensible objects, and particularly those of sight, are undoubtedly the first which exercise the power of abstraction, or separate attention; and here the process is plain. The object makes its appropriate impression upon the organs of sense, and when withdrawn leaves in the mind an idea. Another sensation is received from an object bearing strong features of similarity to the former; by the laws of association, it calls up the idea before produced, and becomes associated with it. Other similar objects are presented, and the features in which they agree being the most frequently called up, engage most the attention of the mind, and thus becoming, in some degree, separate from the objects which originally were connected with them, constitute the abstract idea. The readiness with which these circumstances of resemblance recall the idea or *conception* of the individuals from which they were abstracted, depends upon the habits of the individual, and the number of objects from which the abstract notion was formed. If we had seen but two or three sheep, it is probable that the circumstances of resemblance would be so connected in our minds with the individuals, that one or more of them would be constantly called up when considering the circumstances of resemblance; but if the number be much greater, that is, if the circumstances of resemblance have been frequently in the mind, and particular individuals much less frequently, the notion of these circumstances of resemblance becomes somewhat disjointed from the objects by which it was formed. And though it is probably impossible to have a general notion of any class of objects merely sensible, without the idea of an individual being present in the mind; yet from the causes we have mentioned, the general features of resemblance not being particularly connected with any individual, those features only are strong and vivid, and call the attention of the mind, while all the other circumstances of dissimilarity have little effect upon it, and do not attract its attention.

The procedure of the mind appears to be exactly the same, though less obvious, and usually more difficult of analysis, when the general idea is more remote from sensation, when in fact the notions of the quality, or qualities even in the individual, may be very complex, and this in proportion as it is more intellectual and refined. In the former class of general notions, and even in some instances of the present, where the quality is definite and obvious, it is probable that language would not be requisite. For the abstraction, so far as it is involuntary, is solely the effect of the frequent recurrence of some particular qualities with which they are occasionally combined. But those abstract ideas, in which the circumstances of resemblance between the composing ideas are not very obvious or very distinct, either would not

have

have been formed at all by the bulk of mankind, or at least would have been very confused. We can go very far with those who contend that general ideas would not exist in the mind without the medium of language; but that they could not from any deficiency of mental capacity to form them, does by no means appear certain. The same faculties which now produce them, might have produced them without the powers of *communication*; and there appears no reason why the deaf and dumb child may not form a general idea of men, or horses, or fire, or any object of a similar kind, as well as if capable of annexing terms to the objects of perception.

It can be no objection to this account of the procedure of the mind in generalization, that we are able to form classifications of objects from circumstances which are not calculated to strike the mind of the common observer. When left to itself, before habits of reflection are formed, the mind will be necessarily attracted by the most prominent *sensible* features of resemblance, and the objects would become associated by that bond of union; and in very many cases this would differ in different individuals; but it is indubitable that we may acquire such a command over our associations, that we may be able to combine objects in our minds which have no customary tendency to such combination, by a more factitious connection; and that by the requisite culture of the mind, certain connecting principles are either discovered or confirmed, which could not have been of any force in a more early period of mental progress. In the first of these cases the association is voluntary, and if there were not some apparent benefit resulting from it, or some circumstances calculated to produce it in the mind, it would soon give place to a more natural union. So far, however, as any general idea is formed, its production is accomplished agreeably to the principles we have stated. In the second the operation of the mind is most usually involuntary; when voluntary, the observations on the first case to apply.

It is obvious that the fewer and more distinct the circumstances which are comprehended in the general notion of a class of objects, the more clear and definite will be the general notion itself. And it appears worthy of notice, and tends to confirm the account given of the formation of our general ideas, at least those of visible objects, that the greater the variety subsisting among the individuals or subordinate species comprehended under the general idea, (or, more properly, which possess that quality, or combination of qualities, which compose the general idea,) the less attention, other things being equal, do we pay to the peculiarities of the individual. Thus the general notion of a triangle is merely that of a figure having three sides, formed from the relics of impressions derived from every triangle we have seen; and the varieties of triangles are innumerable: and agreeably to the opinion already mentioned, though we certainly cannot form a *conception* of a triangle which shall be representative of all others without possessing the peculiarities which constitute it an individual, yet the circumstances of its having three sides is so definite, and our attention is so thoroughly confined to it, that the peculiarities of the triangle are not unfrequently totally out of consideration; and if, owing to some particular associations, the triangle on such occasions were not usually the same, we should afterwards be unable to say what kind of a triangle had been in the view of our minds.

To state the fact respecting *conception* (which see) more generally; if we attempt to form a conception of any object, it must, from the very nature of a conception, be individual, —representative, perhaps, of a numerous class, but still pos-

sessing those peculiar features which constitute individuality. It may not be improper to suggest that the want of attention to the difference between a notion and *conception* may have, in some measure, misled those philosophers who have denied the existence of general notions. "The business of conception," says Mr. Stewart, "is to present us with an exact transcript of what we have felt or perceived;" and admitting the truth of this, a conception is that transcript so presented. We shall not enter into the enquiry, whether conception be a distinct faculty of the mind; we may, however, state that it appears to us to be nothing different from memory, except as being a branch of that general faculty; and that a conception differs from an idea, only as species does from genus; that in fact without the aid of the associative faculty, and with retention alone, every idea would be merely a conception. For *the recollection of an individual sensation, or group of sensations, whether seldom or frequently received, is a conception*; but when a number of sensations possessing common features, but in others differing, are received into the mind, the ideas they form there by the laws of association, coalesce with one another; thus constituting those complex ideas or notions, which never from their nature can be conceptions, but which yet may be distinct, and when words are used to denote them, the subjects of reasoning.

Almost an infinite variety of the sensations we receive, are presented to our view so constantly connected with others, that however much it may be in the power of the mind to attend to them in a separate state, it is impossible to form a conception of them separately: but, on the other hand, there is a considerable number of qualities remote from mere sensation, belonging to an extensive range of individual objects, which may be considered by the mind separate from those objects, and have internal feelings or complex ideas attached to the terms which denote them. Now we apprehend it is the grand difference between our general notions, when concerned about things merely sensible, and those which we might call more purely intellectual, that in the former case, the conceptions being usually clear, and frequently very vivid, are very easily brought up by the associative power; and the circumstances of distinction being few, and merely sensible, are, from their very nature, calculated to produce a conception; and so little do we possess any real abstractive power, that it is in most cases impossible to do this without introducing the conception of the whole object: on the other hand, the circumstances of distinction in the case of *intellectual notions* are less definite; they are frequently extremely numerous, and are seldom capable of exciting conceptions, and consequently they do not readily call up any particular individual object to which the general term is applicable. We acknowledge that very much, in these latter respects, depends upon the peculiar circumstances of the case, or upon the habits of the individual. If a person had been remarkably struck with an act of justice, or of disinterested benevolence, for instance, it is probable that, while the vividness of the impression lasted, he would never be able to think of those qualities without the particular fact being recalled into the mind; and if he possessed a lively imagination, or had been present at the performance of it, he would form an immediate conception of the whole scene: or if a person were not much in habits of speculation, he would universally think of some example of the action possessing those qualities. But these circumstances, though they tend to illustrate the operation of the associative power, do not in any way militate against the general truth of the above remarks.

The remarks we have made on the subject of abstraction

or generalization, have been, in a considerable degree, separate from any medium of communication; or at least supposing it not already formed. If every person were left to form his own classifications, language, in very many instances, would be of little utility; because the same features of resemblance would not operate in the same way upon different individuals. But the process of the mind, when language is formed, is somewhat different; because in this case it is restrained, and has not the same unbounded liberty of forming its associations. The mind of the child is not left to classify objects; but these objects are presented to it already classed, owing to the same word being used to express them, and it is very interesting to observe the efforts of the young mind in finding out some features of resemblance between the objects which had previously been presented to it with the same name. The two following facts will explain our meaning; and perhaps contribute to illustrate the subject. A boy of about two years and a half old, who was remarkably fond of looking at watches, was shewn a hunting watch, and told what it was. He repeatedly looked at both sides with great attention, and appeared very greatly perplexed. Some features of resemblance to other watches which he had seen must have struck him; but he could not find the *face*, which appeared hitherto to have been his chief criterion. At last he put it to his ear; and perceiving that the sound was the same as in other watches, he was satisfied. If he had then left it, the *ticking* would probably have been the only feature of resemblance which would have satisfied him, at least till he had seen a watch when down; but the face was shewn him, and he would doubtless have that feature of resemblance fixed still more strongly in his mind than it was before. This fact was noticed several years ago: the following we have just observed, and we state it without comment. A child between six and seven years of age had been told, while looking over the plates in Chandler's History of Persecutions, that *persecution* means, "putting persons to death, or doing any other harm to them, because they do not believe the same as we do." Some days after, while again looking at the plates, (which have in many instances, we doubt not, furnished the rudiments of the abhorrence of persecution and love of religious liberty, seldom, however, without adding a tinge of Protestant bigotry,) she asked what persecution meant. Her father, who had been present at the former explanation, expressed some surprise at her inattention or forgetfulness: she made no reply, but some minutes after, she said, "Papa, on the beach at ——— it is said, Whoever throws any rubbish on the beach, shall be *prosecuted* as the law directs." It did not require a father's observation to see that the defect of memory and attention was merely imaginary, and that the little girl's mind had been puzzled by a *verbal* similarity, where she perceived no similarity in the mode of application. It was more difficult to explain *persecution*; but it was attempted, and the circumstance gave an opportunity of impressing the importance of attending to *words*, and observing the difference between them when spoken or written, or, in more familiar language, learning to *spell* well.

We had proposed to enter at some length, in this division, into the consideration of Mr. Stewart's theory respecting the operation of the mind in those actions, external or internal, which were once wholly or in part voluntary. But we are too much limited as to time and room to allow it; and it is a theory which must fall to the ground when the nature of the mind is duly considered, and which confessedly derives no evidence from memory, and as far as we can see, can derive no known justification from *consciousness*. We beg our readers' attention to what we have said on the subject in

our first division, and in other parts of this article, and shall here only subjoin a few additional facts and observations.

The following statements we take as we find them in the Morning Chronicle of Dec. 27, 1813. "Shakspeare says of lady Macbeth, when walking in her sleep, her eyes are open, but her sense is shut. This, it appears, is not always the case. Sometimes the eyes continue, even in sleep, to present objects to the mind which engage its attention; as in the case of Johannes Oporinus, a printer, who being employed one night in correcting the copy of a Greek book, fell asleep as he read, and yet ceased not to read till he had finished not less than a whole page, of which, when he awoke, he retained no recollection. Theory of Dreams, p. 62." We do not speculate upon the fact, because the particular points in question are not detailed with sufficient precision; but they seem to us in no way at variance with the statement of our great mental dramatist, if, as we take for granted, he meant that the lady's mind was *unconscious* of the impressions made upon her senses, though these might still direct her bodily motions. The writer of this article has a perfectly distinct recollection of a fact which happened respecting himself when a boy. He was reading one evening to some friends, in a work which did not call for much attention, the words, modes of expression, &c. being sufficiently familiar. He remembers that his mind gradually wandered from the book, and by degrees he not only lost all thought of what was going on, but fairly fell asleep: his eyes were open, but his sense was shut. He afterwards found, that he had for some time been reading indistinctly, but intelligibly, till at last sleep so far overcame the muscular action requisite for the erect posture, that he nodded and awoke. The fact amused him, and was fixed in his memory long before he began to reason about the processes of the *mind* in such cases. He wishes to lead the attention of the reader to another fact. He has more than once observed, after glancing over a page in some book, for the purpose of reference, &c., that trains of thought and feeling have been begun in his mind, for which he could not account, till on more minutely examining the page, he has discovered some *single* word, which he could have no doubt from the circumstances of the case had, by its impression on the external organ, excited the train he was conscious of, though it had not itself excited the notice of the mind. It must, however, be added, that he has also been able at other times, to trace an indistinct recollection of having actually perceived the word in question.

On referring to Dr. Reid's truly excellent Essay on the Will, which contains a great variety of important observations, with the value of which we were not before acquainted; or we should have referred to them in a more appropriate situation, we find that we agree with him on this question more than Mr. Stewart does. "A man (he says, ch. 3.) *sees not what is before his eyes, when his mind is occupied about another object*. In the tumult of a battle, a man may be shot through the body, without knowing any thing of the matter, till he discover it by the loss of blood or of strength." In the following passage (ch. 1.) we see the rudiments of what we would term the *doctrine of motives*. "If the mind were always in a state of perfect indifference, without any incitement, motive, or reason, to act, or not to act, to act one way rather than another, our active power, having no end to pursue, no rule to direct its exertions, would be given in vain. We should either be altogether inactive, and never *will to do any thing*, or our volitions would be perfectly unmeaning and futile, being neither wise nor foolish, virtuous nor vicious." The former we think would have been the case. We must add one more extract, from a former part of the chapter, which we think over-

turns the foundation of his theory respecting the intellect. "Every act of the will must have an object. He that wills, must will something; and that which he wills is called the object of his volition. *As a man cannot think without thinking of something*, nor remember without remembering something, so neither can he will without willing something. Every act of will, therefore, must have an object; and the person who wills, *must have a conception*, more or less distinct, of what he wills." In writing this essay, Dr. Reid seems to have left himself to the guidance of his own sound judgment, and accurate observation and reflection, qualities which his works often display. In his theory about perception, &c. he was misled by a mistaken idea, that it was the *only* means of opposing opinions which his good sense and moral and religious principles, convinced him were unfounded in truth and human nature, and which he perceived leading to dangerous consequences. "The discovery (he himself says) was the birth of time, not of genius; and Berkeley and Hume did more to bring it to light, than the man who hit upon it." Life, p. xci. 8vo.

We have only farther to observe, that Condillac (*Essai sur l'Origine des Connoissances humaines*, sect. ii. ch. i. § 6—9.) in defending the opinion, that we have always a consciousness of external impressions, though often so slight that it does not affect the memory, brings forward two hypotheses only besides his own, to account for the phenomena on which it is founded. The first is, that when the mind is engrossed with some interesting object of perception, the brain is in such a state of general excitement, that this is not affected by the external impressions from other objects. The second is, that though every impression on the external organs of sensation is communicated to the brain, or common sensorium, and consequently produces a perception in the mind, yet cases may occur in which the mind does not notice them. The supposition is obviously absurd; and the philosopher adds, "I here declare in favour of Locke, for I can form no idea of such a perception; I should be as well pleased for any one to say, I perceive without perceiving." Of course the instant the mind becomes conscious of the change in the sensorium, produced by any external impression, the consciousness of it makes it a perception, or, more accurately, a sensation. But it is clear, that Condillac begs the question, by using the term *perception*, which necessarily implies *consciousness*. (See PERCEPTION.) The opinion advanced in this article is altogether a distinct case, *viz.* that sensorial changes are *not* necessarily attended with consciousness; and this is we think the only other supposition, and is fully borne out by evidence. It may be easily made to appear ridiculous by half-stating it, or by over-stating it; and we doubt not Tucker would do it, as he has done with Hartley's doctrine of secondarily automatic motions, in an amusing passage, which we cannot find to refer to, representing a long train of associated motions, originating in sensible vibrations, and going on without will or understanding. If Hartley had seen it, he would probably have merely said, that his theory was unaffected by it. Such at least is the fact.

3. *On Words, and the Ideas associated with them.*—Words may be considered in four points of view; *first*, as impressions upon the ear; *secondly*, as the actions of the organs of speech; *thirdly*, as impressions made upon the eye by characters; *fourthly*, as the actions of the hand in writing. We learn the use of them in this order; for children get an imperfect knowledge of the meaning of the words of others; then learn to speak themselves; then to read; and lastly, to write. Now it is evident, that in the first of these ways, many sensible impressions, and external feelings, are asso-

ciated with particular words and phrases, so as to give these the power of raising the corresponding ideas; and that the three following ways increase and improve this power, with some additions to the ideas and variations of them. The second is the reverse of the first, and the fourth of the third. The first ascertains the ideas belonging to words and phrases in a gross manner, according to their usage in common life. The second fixes this, and makes it ready and accurate. The third has the same effect as the second, and also extends the significations of words and phrases, by new associations, and, in particular, by associations with other words, as in definitions, descriptions, &c. The advancement of the arts and sciences is chiefly carried on by new significations given to words in this third way. The fourth, by converting the reader into a writer, helps him to be expert in distinguishing, quick in recollecting, and faithful in retaining, these new significations of words. The action of the hand is not, indeed, an essential in this fourth method, composition by persons born blind having nearly the same effect; it is, however, a common attendant on composition, and has a considerable use deducible from association, at the same time making the analogy between the four methods more conspicuous and complete.

Hence it appears, that words and phrases must excite ideas in us by association; and it further appears, that they can do it by no other means, since all the ideas which any word excites, are deducible from some of the sources above-mentioned, most usually from the first or third; and because words of unknown languages, terms of art not yet explained, barbarous words, &c. have either no ideas connected with them, or only such as some fancied resemblance, or prior association, suggests. It deserves to be remarked here, that articulate sounds are, by their variety, number, and ready use, peculiarly fitted to signify and suggest, by association, both our simple ideas, and our complexions formed from them.

We now proceed to describe the manner in which ideas are associated with words, beginning with childhood.

*First*, then, the association of the *names of visible objects*, with the impressions which these objects make upon the eye, seems to take place more early than any other, and to be effected in the following manner. The name of the visible object, the mother for instance, is pronounced and repeated by the attendants to the child, more frequently when his eye is fixed upon his mother, than when upon any other objects, and much more so than when upon any particular one. The word *mamma* is also founded in an emphatical manner, where the child's eye is directed to his mother with earnestness and desire.

The association, therefore, of the sound *mamma*, with the visible impression of the mother on the retina, will be far stronger than that with any other visible impression, and thus overpower all the other accidental associations; and these will also themselves contribute to the same end, by opposing one another. And when the child has acquired so much voluntary power over his motions, as to direct his head and eyes towards his mother, upon hearing her name, this process will go on with accelerated velocity; and thus, at last, the word will excite the visible idea readily and certainly. The same association of the visible impression of the mother with the sound *mamma*, will by degrees overpower all the accidental associations of this visible impression with other words; and, at last, be so closely confirmed, that the visible impression will excite the audible idea of the word. This, however, is not to our present purpose; but it is a process which takes place at the same time with the other, and contributes to illustrate and confirm it. Both together furnish

a complete instance of one of the classes of connections. See Div. IV. 1.

*Secondly*: this association of words with visible appearances, being made under many particular circumstances, must affect the visible ideas with a like particularity. Thus the mother's dress, and the situation of the fire in the child's nursery, make part of the child's ideas of his mother and fire. But then as his mother often changes her dress, and the child often sees a fire in a different place, and surrounded by different visible objects, these opposite associations must be less strong than the part which is common to all; and consequently we may suppose, that while his idea of that part which is common, and which we may call essential, continues the same, that of the particularities, circumstances, and adjuncts, varies.

*Thirdly*: when the visible objects impress other vivid sensations besides those of sight, such as pleasant or unpleasant tastes or smells, warmth, or coldness, &c. with sufficient frequency, these must leave relics or ideas, which will be associated with the visible ideas of the objects, and with the names of the objects, so as to depend upon them. Thus an idea, or nascent perception, of the taste of the mother's milk, will rise up in the mind of the child, on hearing her name; and hence the whole idea belonging to the word *mamma* now begins to be complex, consisting of two sets of ideas derived from different senses: and these ideas will be associated together, not only because the same word raises both, but also because the original sensations were often received together. The stronger idea will therefore assist the weaker. In common cases, visible ideas are the strongest; or at least occur the most readily; but in this case it appears to be otherwise. It would be easy to proceed to various other, and more complex cases, in which the component ideas are united, and all made to depend on the respective names of visible objects; but what has been said is sufficient to shew what ideas the names of visible objects, proper and appellative, raise in us.

*Fourthly*: we must, however, observe, respecting appellatives, that sometimes the *idea*, associated with the term, is the common compound result of all the sensible impressions received from the several objects comprised under the general appellation; but sometimes it is, in a great measure at least, the particular idea of some one of these; viz. when the impressions arising from some one of the class are more frequent and vivid than those of the rest.

*Fifthly*: the names denoting sensible qualities, whether substantive or adjective, such as *whiteness*, *white*, &c. get their ideas in a manner which will be easily understood from what has been already stated. That visible impression which is common to all objects which have been frequently seen, having the name *white* applied to them, becomes the leading feature of the ideas belonging to them; and the word excites that most vividly and universally, while it excites only faintly, or at least with great variation, the ideas of the peculiarities, circumstances, and adjuncts; and so of the other sensible qualities.

*Sixthly*: the names of visible actions, as walking, striking, &c. raise the proper visible ideas by a like process. Other ideas may likewise adhere in certain cases; as in those of talking, feeling, speaking, &c. Sensible impressions, in which no visible action is concerned, may also have ideas dependent upon words; some visible ideas, however, generally intermix themselves here. These actions and perceptions are generally denoted by *verbs*, though sometimes by *substantives*.

*Seventhly*: as children may learn to read words, not only in an elementary way, viz. by learning the letters and syl-

lables of which they are composed, but also in a summary one, viz. by associating the sound of entire words with their visible representations; and must, in some cases, be taught in this latter method, that is, whenever the sound of the word differs from that of its elements, so both children and adults often learn the ideas belonging to whole sentences, in a summary way, and not by adding together the ideas of the several words in the sentence. And wherever words occur, which, separately taken, have no distinct proper ideas, their use can be learned in no other way than this; and this will be the case where the words are extremely general, applying to a vast variety of visible objects, and to circumstances and relations which are not obvious to the uncultivated mind. Now, pronouns, and particles, and many other words, are of this sort. Thus, *I walk*, is associated at different times with the same visible impressions as *mamma walks*, *brother walks*, &c. and therefore, for a long time, can suggest nothing permanently but the action of walking. However, the pronoun *I*, in this, and innumerable other short sentences, being always associated with the person speaking, as *those* with the persons spoken to, and *he* with the person spoken of, the frequent recurrency of this teaches the child the use of the pronouns; that is, teaches him what difference he is to expect in his sensible impressions, according as this or that pronoun is used; the vast number of instances making up for the very small quantity of information which each, singly taken, conveys. Of the actual procedures of language respecting the pronouns, see LANGUAGE, col. 8, in which we perceive the printer has unfortunately represented a Gothic verb in Greek characters. In like manner different particles, that is, adverbs, conjunctions, and prepositions, being used in sentences where the substantives, adjectives, and verbs are the same; and the same particles, when these are different, in an endless recurrency, teach children the use of the particles in a gross general way. For it may be observed that children are much at a loss for the true use of the pronouns and particles for some years; and that they often repeat the proper name of the person, instead of the pronoun; which confirms the foregoing reasoning.

*Eighthly*: the attempts which children make to express their own wants, perceptions, pains, &c. in words, and the corrections and suggestions of the attendants, are of the greatest use in all the steps that we have hitherto considered, and especially in the last, respecting the particles and pronouns.

*Ninthly*: learning to read helps children much in the same respects; especially as it teaches them to separate sentences into the several words which compose them; which those who cannot read are scarcely able to do, even when they arrive at adult age.

Thus we may see how children and others are enabled to understand a continued discourse, relating to sensible impressions only, and how the words, in passing over the ear, must raise up trains of visible and other ideas, by the power of association. Our next inquiry must be concerning the words which denote either intellectual things, or collections of other words.

*Tenthly*: the words which relate to the several passions, love, hatred, fear, anger, &c. being applied to the child when he is under the influence of these passions, get the power of raising up the ideas of those passions, and also the usual associated circumstances. The application of the same words to others, helps also to annex the ideas of the associated circumstances to them, and even of the passions themselves, both from the infectiousness of our natures, and from the power of associated circumstances to raise the passions. It is, however, to be observed, that the words denoting

denoting the passions, do not, for the most part, raise up in us any degree of the passions themselves, but only the ideas of associated circumstances. We are supposed sufficiently to understand the continued discourses into which these words enter, when we form true notions of the actions, particularly the visible ones, attending the feelings denoted.

*Eleventhly*: the names of *intellectual* and *moral* qualities and operations, stand for a description of these qualities and operations; and therefore, if dwelt upon, excite such ideas as these descriptions in all their particular circumstances do. But the common sentences into which these words enter, pass over the mind too quick, for the most part, to allow of such delay. They are acknowledged as familiar and correct, and suggest certain associated visible ideas, and nascent internal feelings, taken from the description of these names, or from the words which are usually joined with them in discourses and writings.

*Twelfthly*: there are many *terms of art* in all the branches of learning, which are defined by other words, and which, therefore, are only compendious substitutes for them. The same holds in common life, in numberless instances. Such words sometimes suggest the *words* of their definitions, sometimes the *ideas* of these words, sometimes a particular species comprehended under the general term, &c. But whatever they suggest, it may be easily seen that they derive the power of doing it from association.

*Lastly*: there are words used in *abstract sciences* which can scarcely be defined or described by other words, such as identity, existence, &c. The use of these must therefore be learned, as that of the particles is. Indeed children learn their first imperfect notions of all the words considered in this and the last three paragraphs, chiefly in this way; and come to more precise and explicit ones only by means of books, as they advance to adult age, or by endeavouring to use them properly in their own deliberate compositions.

After the foregoing observations, which Mr. Stewart would hardly term *reveries*, Hartley adds the following remark, which may leave on the reader's mind a favourable impression of his humility and caution; and we quote it verbatim.

"This is by no means a full or satisfactory account of the ideas which adhere to words by association. For the author perceives himself to be still a mere novice in these speculations; and it is difficult to explain words to the bottom by words; perhaps impossible. The reader will receive some addition of light and evidence in the course of this section; also in the next, in which I shall treat of propositions and assent. For our assent to propositions, and the influence which they have over our affections and actions, make part of the ideas that adhere to words by association; which part, however, could not properly be considered in this section." The term *idea* seems to be used here with too much latitude; and it is to such cases that Mr. Stewart, forgetful of his own excellent maxims on candour, seems principally to have attended. We do not wish to apply the term in any instance to *states* or *operations* of the mind. Feelings, or complex ideas, produced by those states or operations either in the way of recollection, or of actual association at the time of passing, may, in the Hartleyan nomenclature, be termed ideas; and it is probably to these that Hartley really refers. But to proceed.

From the foregoing train of reasoning, the following inferences may be drawn.

(1) Including under the head of *definitions*, description, or any way of explaining a word by other words, excepting that by a mere synonymous term; and for the sake of brevity, excluding for the present from the head of ideas,

the visible idea of the character of a word, and the audible one of its sound, and also all ideas which are either extremely faint, or extremely variable; words may be distinguished into the four following classes: 1, such as have ideas only; 2, such as have both ideas and definitions; 3, such as have definitions only; 4, such as have neither ideas nor definitions.

It is difficult to fix precise limits to these four classes, so as to determine accurately where each ends, and the next begins; and if we consider these things in the most general way, there is perhaps no word which has not both an idea and a definition; that is, which is not occasionally attended with some one or more internal feelings, and which may not be explained, in some imperfect manner at least, by other words. However, the following are some instances of words which have the fairest right to be placed in their respective classes.

The names of simple sensible objects are of the *first* class. Thus, *white*, *sweet*, &c. excite ideas, but cannot be defined. Words of this class stand only for the stable parts of the respective ideas, not for the several variable particularities, circumstances, and adjuncts, which here intermix themselves.

The names of natural bodies, animal, vegetable, or mineral, are of the *second* class; for they excite aggregates of sensible ideas, and at the same time may be defined by an enumeration of their properties and characteristics. Thus, likewise, geometrical figures have both ideas and definitions. The definitions, in both cases, are so contrived, as to leave out all the variable particularities of the ideas, and also to be more full and precise, than the ideas generally are in the parts, which are of a permanent nature.

Algebraic quantities, such as roots, powers, surds, &c. belong to the *third* class; and have definitions only. The same may be said of scientific terms of art, and of most abstract general terms, moral, metaphysical, and vulgar. However, mental feelings are apt to attend some of these even in passing slightly over the ear, and these feelings may be considered as ideas belonging to the respective terms. Thus the very words *gratitude*, *mercy*, *cruelty*, *treachery*, &c. even separately taken, affect the mind; and yet, since all reasoning upon them is to be founded on their definitions, it seems best to refer them to this third class. With the opinions given in this paragraph we cannot fully agree, as the reader will perceive from our remarks on generalization, VIII. 2.

Lastly, the particles *the*, *of*, *to*, *for*, *but*, &c. have neither definition nor ideas, as those terms have just been limited.

(2) It will easily appear, from the observations here made upon words, and the associations which adhere to them, that the languages of different ages and nations must bear a great general resemblance to each other, and yet have considerable particular differences; whence any one may be translated into any other, so as to convey the same ideas in general, and yet not with perfect precision and exactness. They must resemble one another, because the phenomena of nature, which they are all intended to express, and the uses and exigencies of human life to which they minister, have a general resemblance. But then, as the bodily make and genius of each people, the air, soil, and climate, commerce, arts, sciences, religion, &c. make considerable differences in different ages and nations, it is natural to expect, that the languages should have proportionable differences in respect of each other.

In learning a new language, the words of it are at first substituted for those of our native language; that is, they

are associated, by means of these, with the proper objects and ideas. When this association is sufficiently strong, the middle bond is dropped, and the words of the new language become substitutes for, and suggest directly and immediately objects and ideas; also clusters of other words in the same language.

In learning a new language, it is much easier to translate from it into the native one, than back again; just as young children are much better able to understand the expressions of others, than to express their own conceptions. And the reason is the same in both cases. Young children learn at first to go from the words of others, and those who learn a new language from the words of that language, to the things signified. And the reverse of this, *viz.* to go from the things signified to the words, must be difficult for a time from the nature of successive associations. It is to be added here, that the nature and connections of the things signified, often determine the import of sentences, though their grammatical analysis is not understood; and that we suppose the person, who attempts to translate from a new language, is sufficiently expert in passing from the things signified to the corresponding words of his own language. The power of association is every where conspicuous in these remarks.

(3) It follows also from the foregoing reasoning, that persons, who speak the same language, cannot always mean the same things by the same words, but must sometimes mistake each other's meaning. This confusion and uncertainty arise from the different associations transferred upon the same words, by the difference in the accidents and events of our lives. It is, however, much more common in discourses concerning abstract matters, (where the terms stand for collections of other terms, sometimes at the pleasure of the speaker or writer,) than in the common and necessary affairs of life; for here frequent use, and the constancy of the phenomena of nature, intended to be expressed by words, have rendered their sense determinate and certain. *However, it seems possible, and even not very difficult, for two truly candid and intelligent persons to understand each other upon any subject.*

That we may enter more particularly into the causes of this confusion, and consequently be the better enabled to prevent it, let us consider words according to the four classes above mentioned.

Now mistakes will happen in words of the *first* class, *viz.* such as have ideas only, where the persons have associated these words with different impressions. And the method to rectify any mistake of this kind, is for each person to shew with what actual impression he has associated the word in question. But mistakes here are not common.

In words of the *second* class, *viz.* such as have both ideas and definitions, it often happens, that one person's knowledge is much more full than another's, and consequently his idea and definition much more extensive. This must cause a misapprehension on one side, which yet may be easily rectified by recurring to the definition. It happens also sometimes in words of this class, that a man's ideas are not always suitable to his definition; that is, are not the same with those which the words of the definition would excite. If then this person should pretend, or even design, to reason from his definition, and yet reason from his idea, misapprehension will arise in the hearer, who supposes him to reason from his definition merely.

In words of the *third* class, which have definitions only and no immediate ideas, mistakes generally arise through want of fixed definitions being mutually acknowledged and kept to. However, as imperfect fluctuating ideas, that

have little relation to the definitions, are often apt to adhere to the words of this class, mistakes must arise from this class also.

As to the words of the *fourth* class, or those which have neither ideas nor definitions, it is easy to ascertain their use by inserting them in sentences where their import is known and acknowledged; this being the method in which children learn to decypher them; so that mistakes could not arise in the words of this class did we use moderate care and candour. And, indeed, since children learn the uses of words most evidently without having any data,—any fixed point at all, it is to be hoped, that philosophers and candid persons may learn at least to understand one another with facility and certainty; and get to the very bottom of the connection between words and ideas.

(4) When words have acquired any considerable power of exciting pleasant or painful feelings, by being often associated with such things as do this, they may transfer a part of their pleasures and pains upon indifferent things, by being at other times often associated with such. This is one of the principal sources of the several factitious pleasures and pains of human life. Thus, to give an instance from childhood, the words *sweet, good, pretty, fine, &c.* on the one hand, and the words *bad, ugly, frightful, &c.* on the other, being applied by the nurse and attendants, in the child's hearing, almost promiscuously, and without those restrictions that are observed in correct speaking; the one set to all the pleasures, and the other to all the pains of the several senses; must by association raise up general pleasant and painful feelings, in which no one part can be distinguished above the rest; and when applied by further associations to objects of a neutral kind, they must transfer a general pleasure or pain upon them.

All the words associated with pleasure must also affect each other by this promiscuous application. And the same holds in respect of the words associated with pains. However, since both the original and the transferred pleasures and pains heaped upon different words are different, and in some cases widely so, every remarkable word will have a peculiar internal feeling or sentiment belonging to it; and there will be the same relations of affinity, disparity, and opposition, between the internal feeling, belonging to words, as between the several genera and species of natural bodies, between tastes, smells, colours, &c. Many of these ideas, though affording considerable pleasure at first, must sink into the limits of indifference; and some of those, which afforded pain at first, into the limits of pleasure. What is here said of words, belongs to groups of them, as well as to separate words. And the ideas of all may still retain those peculiarities, by which they are distinguished from each other, after they have fallen below the limits of pleasure into indifference, just as obscure colours, or faint tastes, do.

It is observable, that the mere transit of words expressing strong ideas over the ears of children affects them; and the same thing is true of adults, in a less degree. However, the last have learnt from experience and habit to regard them chiefly, as they afford a rational expectation of pleasure and pain.

(5) Since words thus collect ideas from various quarters, unite them together, and transfer them both upon other words, and upon foreign objects, it is evident, that the use of words adds much to the number and complexity of our ideas, and is the principal means by which we make mental and moral improvement. This is verified abundantly by the observations which are made upon persons born deaf, and continuing so. It is probable, however, that these persons  
make

make use of some symbols to assist the memory, and fix the imagination; and they must have a great variety of pleasures and pains transferred upon visible objects from their associations with one another, and with sensible pleasures of all kinds; but they are very deficient in this, upon the whole, through the want of the associations of visible objects and states of mind, &c. with words. Learning to read must add greatly to their mental improvement; yet still their intellectual capacities cannot but remain very narrow.

Persons blind from birth must proceed in a manner different from that before described, in the first ideas which they affix to words. As the visible ones are wanting, the others, particularly the tangible and audible ones, must compose the aggregates, which are annexed to words. However, as they are capable of learning and retaining as great a variety of words as others, and can associate with them pleasures and pains from the four remaining senses, and also use them as algebraists do the letters which represent quantities, they fall little, or nothing short of others in intellectual accomplishments, and may arrive even at a greater degree of spirituality and abstraction in their complex ideas.

6. On the whole it follows, from the foregoing investigation, that when children or others first learn to read, the view of the words excites ideas, only by the mediation of their sounds, with which alone their ideas have hitherto been associated. And thus it is that children and illiterate persons best understand what they read by reading aloud. By degrees the intermediate links being left out, the written or printed characters suggest the ideas directly and instantaneously; so that persons who are much in the habit of reading, understand more readily by passing over the words with the eye only; since this method, by being more expeditious, brings the ideas closer together. However, all are peculiarly affected by words pronounced in a manner suitable to their sense and design; which is still an associated influence.

Such are the fundamental principles of Hartley respecting words. In the rest of his investigations on this subject, mixed with opinions which appear to us hypothetical, are many highly important observations, illustrative of his general theory, and of the procedures of language; but for these we must refer to p. 81—85 of his work.

3. On Propositions and the Nature of Assent.—Whatever be the precise nature of assent and dissent, they must class with ideas, being only those very complex internal feelings which are connected by association with such groups of words as are called propositions in general, or affirmations and negations in particular.

Assent, and consequently its opposite, dissent, may be distinguished into two kinds, rational and practical. *Rational assent* to any proposition may be defined, a readiness to affirm it to be true, proceeding from a close association of the ideas suggested by the proposition, with the idea or internal feeling belonging to the word truth; or of the terms of the proposition with the word truth. Rational dissent is opposite to this. *Practical assent* is a readiness to act in such a manner as the frequent vivid recurrence of the rational assent disposes us to act; and practical dissent the contrary.

Practical assent is, then, the natural consequence of rational assent, when sufficiently impressed. It must, however, be observed; *first*, that some propositions, mathematical ones for instance, admit only of a rational assent, the practical not being applied to them in common cases: *secondly*, that the practical assent is sometimes generated, and arrives at a

higher degree of strength, without any previous rational assent, and by methods which have little or no connection with it; yet still is, in general, much influenced by it, and conversely exerts a great influence upon it: *thirdly*, practical assent may be in opposition to rational assent, and in consequence of its having been long and firmly cultivated, may altogether prevent the latter from influencing the conduct.

Let us next inquire into the causes of rational and practical assent, beginning, 1, with that given to *mathematical conclusions*.—Now, the original cause that a person affirms the truth of the proposition, *twice two are four*, is the entire coincidence of the visible or tangible idea of *twice two* with that of *four*, as impressed upon the mind by various objects. We see every where that both are only different names for the same impression; and it can only be in consequence of association that the word truth, its definition, or internal feeling, becomes appropriated to this coincidence. Where the numbers are so large that we cannot form any distinct visible ideas of them, as when we say that 12 times 12 are equal to 144, rational assent is founded, if not on the authority of a table or a teacher, on a coincidence of words arising from some method of reckoning up 12 times 12, so as to conclude with 144, and resembling the coincidence of words which attends the before-mentioned coincidence of ideas in the simple numerical propositions. The operations of addition, subtraction, multiplication, division, and extraction of roots, with all the most complex operations relating to algebraic quantities, considered as the denotements of numbers, are no more than methods of reducing this coincidence of words, founded upon, and rising above, one another. And it is merely association again, which appropriates the word truth, &c. to the coincidence of the words or symbols which denote the numbers.

This coincidence of terms is considered as a proof that the visible ideas of the numbers under consideration would coincide as much as the visible ideas of twice two and four, were the former equally distinct with the latter; and, indeed, the same thing may be fully proved, and often is so by experiments with counters, lines, &c. And hence, thinking persons who make a distinction often unthought of, between the coincidence of terms and that of ideas, consider the real and absolute truth to be as great in complex numerical propositions as in the simplest. Now, as it is impossible to gain distinct visible ideas of different numbers, where at least they are considerable, terms denoting them are a necessary means of distinguishing them one from another, so as to reason justly respecting them. In geometry there is a like coincidence of lines, angles, spaces, and solid contents, to prove them equal in simple cases. Afterwards, in complex cases, we substitute the terms whereby equal things are denoted for each other, and then the coincidence of the terms to denote the coincidence of the visible ideas, except in the new step advanced in the proposition; and thus we get a new equality, denoted by a new coincidence of terms; and this, in like manner, we employ in order to obtain a new coincidence of terms, and so on. This resembles the addition of unity to any number in order to make the next; as of 1 to 20 in order to make 21. We have no distinct visible idea of 20 or of 21; but we have of the difference between them, by fancying to ourselves a heap of things, supposed or called twenty in number, and then further fancying one thing to be added to it. By a like process in geometry we arrive at the demonstration of the most complex propositions. The properties of numbers are applied to geometry in many cases, as when we demonstrate a line or space to be half or double of any other, or in any other

other ratio to it. And as, in arithmetic, words stand for indistinct ideas, in order to help us to reason about them as accurately as if they were distinct; and as cyphers also stand for words, for the same purpose; and letters for cyphers, to render the conclusions less particular; so letters are put for geometrical quantities also, and the agreements of the letters for those of the quantities.

Thus we see the foundation upon which the whole doctrine of quantity is built; for all quantity is denoted either by number, or by extension, or by letters denoting either one or the other. The coincidence of ideas is the foundation of rational assent in simple cases; and that of ideas and of terms, or of terms alone in complex cases. This is upon the supposition that the quantities are to be proved equal; but if they are to be proved unequal, the want of coincidence answers the same purpose. If they are in any numerical ratio, this is only introducing a new coincidence. Thus it appears that the use of words, either as visible or as audible symbols, is necessary for geometrical and algebraic reasonings, as well as for arithmetical. We may see also that association prevails in every part of the processes hitherto described.

But these are not the only causes of giving rational assent to mathematical propositions. The recollection of having once examined and assented to each step of a demonstration, the authority of an approved writer, &c. are often sufficient to gain our assent, though we understand no more than the import of the proposition; nay, even though we do not proceed so far as this. Now this again is a mere transfer of association; the recollection, authority, &c. having been in a great number of cases associated with the before-mentioned coincidence of ideas and terms.

But here a new circumstance arises; for memory and authority are sometimes found to mislead; and the recollection of such experience puts the mind into a state of doubt, so that sometimes truth, sometimes falsehood, will recur and unite itself with the proposition under consideration, according as the recollection, authority, &c., in all their peculiar circumstances, have been, on the whole, associated with truth or falsehood.

Thus the idea belonging to a mathematical proposition, with the rational assent or dissent arising in the mind, as soon as it is presented to it, is nothing more than a group of ideas, united by association, and forming a very complex idea. And this idea is not merely the sum of the ideas belonging to the terms of the proposition, but also includes the motions or feelings, whatever they be, which belong to the words *equality*, *coincidence*, and *truth*, and in some cases those of *utility*, *importance*, &c. For mathematical propositions are, in some cases, attended with a practical assent, in the proper sense of these words; as when a person takes this or that method of executing a projected design, in consequence of some mathematical proposition assented to from his own examination, or from the authority of others. Now the train of voluntary actions, here denoting the practical assent, is produced by the frequent recurrency of ideas of utility and importance. These operate by association, and though the rational assent be a previous requisite, yet the degree of the practical assent is proportional to the vividness of those ideas; and in most cases they strengthen the rational assent by reaction.

(2) Propositions concerning *natural bodies* are of two kinds, vulgar and scientific. Of the first kind are *milk is white*, *gold is yellow*, *a dog barks*, &c. These are evidently nothing more than forming the terms denoting the whole or some component parts of a complex idea, into a proposition, or employing those denoting some of its com-

mon adjuncts in the same way. The assent given to such propositions arises from the associations of the terms as well as of the ideas denoted by them.

In scientific propositions concerning natural bodies, a definition having been made of the body from its properties, another property or power is joined to them as a constant or common associate. Thus gold is said to be soluble in the nitromuriatic acid. Now to persons who have made the proper experiments a sufficient number of times, these words suggest the ideas which occur in those experiments, and, conversely, are suggested by them, in the same manner as the vulgar propositions above-mentioned, suggest and are suggested by common appearances. But then, if they be scientific persons, their readiness to affirm that gold is soluble in this acid universally, arises also from the experiments of others, and from their own and other persons' observations on the constancy and tenor of nature. They find it to be a general truth, that almost any two or three remarkable qualities of a natural body infer the rest, being never found without them; and hence arises a readiness to affirm respecting all bodies possessing those two or three leading qualities, whatever may be affirmed of any one body.

The propositions formed respecting natural bodies are often attended with a high degree of practical assent, arising chiefly from some supposed utility and importance, and which is no way proportional to the foregoing or similar acknowledged causes of rational assent. And in some cases the practical assent takes place before the rational, but there, after some time, the rational assent is generated and cemented most firmly by the prevalence of the practical. This process is particularly observable in the regards paid to medicines; that is, in the rational and practical assent to the propositions concerning their virtues.

The influence of the practical assent over the rational arises from their being united in so many cases. And the vividness of the ideas arising from the supposed utility, importance, &c. produce a more ready and closer union of the terms of the propositions.

(3) The evidences for *past facts* are a man's own memory, and the authority of others. These are, under proper restrictions, the usual associates of true past facts, and therefore produce the readiness to affirm a past fact to be true, that is, the rational assent. The integrity and competency of the witnesses being the principal restriction or requisite in the account of past facts, become principal associates to the assent to them; and the contrary qualities to dissent.

If it be asked how a narration of an event supposed to be certainly true, or to be doubtful, or to be entirely fictitious, differs in its effect upon the mind in these circumstances respectively, the words in which it is related being the same in each,—it may be replied, *first*: in having the terms *true*, *doubtful*, or *fictitious*, with a variety of ideas usually associated with them, and the corresponding internal feelings of respect, anxiety, dislike, &c. connected with them respectively; whence the whole effects, exerted by each upon the mind, will differ considerably from one another. *Secondly*: if the events be of a very interesting nature, the related ideas will recur oftener, and thus agitate the mind the more, in proportion to the supposed truth of the event. And it confirms this, that the frequent recurrence to the mind of an interesting event, supposed to be doubtful, or even fictitious, by degrees makes it appear like a real one. This affection of the mind, which may be called the practical assent to past facts, often produces the rational assent, as in the other cases before spoken of.

(4) The evidence for *future facts* is of the same kind with that for the propositions concerning natural bodies, being

like it taken from induction and analogy. This is the foundation of the rational assent. The practical depends upon the recurrency of the ideas, and the degree of agitation produced by them in the mind. Hence reflection makes the practical assent grow for a long time after the rational is arisen to its height; or, if the practical assent arises in any considerable degree without the rational, which is often the case, it will generate the rational. Thus the sanguine are apt to believe and assert what they hope to be true; and the timorous what they fear.

(5) There are many speculative abstract propositions in logic, metaphysics, ethics, controversial divinity, &c. the evidence for which is the coincidence or analogy of the abstract terms, in certain particular applications of them, or as considered in their grammatical relations. This causes the rational assent. As to the practical assent or dissent, it arises from the ideas of importance, reverence, piety, duty, ambition, jealousy, envy, self-interest, &c. which intermix in these subjects, and thus, in some cases, add great strength to the rational assent, in others destroy it, and convert it into its opposite.

On the whole it appears that rational assent has different causes in propositions of different kinds, and practical assent in like manner: that the causes of rational are different from those of practical: that there is, however, a great affinity and general resemblance in all the causes: that rational and practical assent exert a perpetual reciprocal influence on each other: and, consequently, that the ideas belonging to assent and dissent, and their equivalents and relatives, are highly complex, unless in the cases of very simple propositions, such as mathematical ones. For besides the coincidence of ideas and terms, they include, in other cases, ideas of utility, importance, respect, disrespect, ridicule, religious affections, hope, fear, &c. and bear some gross general proportion to the vividness of these ideas.

From the preceding statements the following inferences may be deduced. *First*: when a person says, 'I see and approve of what is right, I follow what is wrong,' it shews that the rational and practical assent are at variance; that they have opposite causes; and that neither of these has yet destroyed the other. *Secondly*: the rational and practical faith in religious matters are excellent means of producing each other. *Thirdly*: vicious men, that is, all persons who want practical faith, must be prejudiced against the historical and other foundations for rational faith in revealed religion. *Fourthly*: it is impossible any person should be so sceptical as not to have the complex ideas denoted by the words assent and dissent associated with a great variety of propositions in the same manner as in other persons; just as he must have the same ideas in general affixed to the words of his native language, as other men have. An universal sceptic, therefore, is no more than a person who varies from the common usage in his application of a certain set of words, *viz.* truth, certainty, assent, dissent, &c.

We shall close this division with the remarks on evidence, given by Hartley, in proposition 87; referring to the original those readers who wish to see how he illustrates or proves them, by the employment of simple mathematical expressions, and who are disposed to enter into his highly important and interesting observations respecting the ascertainment of truth, and the advancement of knowledge; and also the application of his principles to the several branches of sciences.

*First*: if the evidences adduced for any proposition, fact, &c. be dependent on each other, so that the first is required to support the second, the second the third, and so on; that is, if a failure of any one of the evidences renders all

the rest of no value, the separate probability of each evidence must be very great in order to make the proposition credible, and this holds the more, in proportion as the dependent evidences are more numerous.

*Second*: if the evidences of any proposition, fact, &c. be independent on each other; that is, if they be not necessary to support each other, but concur, and can, each of them, when established upon its own proper evidences, be applied directly to establish the proposition, fact, &c. in question; the deficiency in the probability of each must be very great, in order to render the proposition perceptibly doubtful; and this holds so much the more, as the evidences are more numerous.

*Third*: the resulting probability may be sufficiently strong in dependent evidences, and of little value in independent ones, according as the separate probability of each evidence is greater or less. Thus the principal facts of ancient history are not less probable practically now, than ten or fifteen centuries ago; nor less so then, than in the times immediately succeeding, because the diminution of evidence in each century is imperceptible. And for the same reason a large number of weak arguments proves little.

*Fourth*: it appears likewise, that the inequality of the separate evidences does not produce much alteration in these remarks. In like manner, if the number of evidences, dependent or independent, be great, we may make great concessions as to the value of each. Again, a strong evidence in dependent ones can add nothing, but must weaken a little; and after a point is well settled by a number of independent ones, all that come afterwards are in one sense useless, because they do no more than remove the imperceptible remaining deficiency; on the other hand, however, as evidence produces different effects on different minds, it is of great moment, in all points of general importance, to have as many satisfactory independent evidences as possible into view; that if one fail in its effects, from peculiar circumstances, another may supply its place. And it will be of great use to pursue these and such like deductions, both mathematically and by applying them to proper instances selected from the sciences, and from common life, in order to remove certain prejudices, which the use of general terms and ways of speaking, with the various associations with them, is apt to introduce and fix upon the mind. It cannot but assist us in the art of reasoning, thus to analyse, recombine, and ascertain our evidences.

The length of this article, (for which the importance of the subject, and the variety of topics discussed in it, will we hope obtain the reader's excuse,) renders it necessary, for the convenience of reference, to subjoin a brief outline of its leading subjects.

*Introductory Remarks.*

Definition of mental philosophy.

Motives to the study of it.

Object of this article.

Proper conduct of our investigations in this branch of science, and the mental requisites for successfully pursuing it.

The leading principle of Dr. Reid's philosophy inconsistent with fact.

Consideration of some of Reid's strictures on Locke.

Platonic and Aristotelian systems respecting ideas.

Reid's arguments against the supposed system of Locke, do not militate against the principles of this article.

Reid's principles, founded on mere verbal distinctions, are inefficacious against Berkeley's hypothesis, or altogether groundless.

## PHILOSOPHY.

- The doctrines of innate ideas and instincts, appeals to ignorance.  
 How far universal belief is a test of truth.  
 The Berkleyan hypothesis inconsistent with sound philosophy.  
 Principles taken for granted in this article.
- I. *General View of the Faculties of the Mind.*  
 Meaning of the term *Mind*.  
 Nomenclature occasionally employed here respecting the objects of consciousness.  
 Sensorial changes not always attended with consciousness. See also VIII. 2.  
 Mr. Stewart's theory on the subject untenable.  
 Extent of the *mechanism* of the mind.  
 The study of Stewart's writings recommended.  
 Introductory course of reading on mental philosophy.  
 Tucker's *Light of Nature* pursued.
- II. *Of the Sensitive Power.*  
 Bodily organs of sensation.  
 The nature of the changes in them occasioning or accompanying mental phenomena unknown.  
 Distinction between *sensations* and *perceptions*.  
 Sensations derived from each sense, with their influence in the formation of our notions and feelings.  
 General observations on sensation: grand law of sensible pleasures and pains.
- III. *Of the Retentive Power.*  
 Ocular spectra.  
 Remarks on the Darwinian theory of ideas.
- IV. *Of the Associative Power.*  
 History of the doctrine of association: progress of it in South and in North Britain.  
 Distinction between *connection* and *composition*.  
 1. *Classes of Connections.*  
 2. *Laws of Connections.*  
   (1) *The Strength of Connections.*  
   (2) *The Duration of Connections.*  
   (3) *The Law of Transference.*  
     Instinctive, implanted, natural, feelings.  
     Some phenomena of belief considered.  
     Disinterested affections.  
   (4) *Habitual Biases.*  
 3. *Composition of Ideas.*  
 4. *Vividness of Complex Ideas.*  
 5. *Of the Affections, &c.*  
 Dr. Cogan's classification of our mental feelings with occasional remarks on it.  
 Objections to his arrangement.  
 Hartley's arrangement of the "general passions" of human nature.
6. *Of the Will.* See also VIII. 2.  
 Objections against Hartley's theory.  
 Hartley's practical remarks highly important.
7. *Classes of the Intellectual Pleasures and Pains*, with an account of the origin of some genera.  
 (1) *Pleasures and Pains of Imagination.*  
 (2) *Of Ambition.*  
 (3) *Of Self-interest.*  
 (4) *Of Sympathy.*  
 (5) *Of Theopathy.*  
 (6) *Of the Moral Sense.*
8. *Ideas of Consciousness.*
- V. *Of the Motive Power.* See also IV. 1.  
 Progress of muscular motion from automatic to voluntary.  
 From voluntary to secondarily automatic.  
 Imitation.
- VI. *Of Memory.*  
 VII. *Of Imagination.*  
 VIII. *Of the Understanding.*  
 1. *General Observations on the Operations of the Understanding.*  
 Consciousness, attention, abstraction, observation, reflection, thinking, meditation, contemplation.  
 Intellectual perception.  
 Judgment.  
 Differences in the power of intellectual perception.  
 Propositions do not always imply an act of judging.  
 Difficulty of separating the processes of thought from those of communication.  
 Mr. Stewart's definition of judgment inadmissible.  
 Act of the mind accompanying the *thoughtful* statement of a proposition.  
 Popular acceptance of *judgment*.  
 Reasoning, investigation, invention.  
 Hartley eminently successful on this point.  
 Defence of Hartley and the Hartleyan philosophy against the leading statements and remarks of Mr. Stewart.  
 Condillac referred to and recommended.
2. *Of Attention, Abstraction, and Generalization.*  
 Formation of general or abstract ideas.  
 Power of *communication* not necessary to their formation.  
 Of *Conception*.  
 Generalization affected by language: instances.  
 Farther evidence of the principle that the mind is not always conscious of the changes in its organs; in opposition to Mr. Stewart's theory.  
 Dr. Reid's essay on the will quoted in favour of that principle.  
 Consideration of some of Condillac's observations in support of an opinion coinciding with the principles of Mr. Stewart.
3. *On Words and the Ideas associated with them.*  
 4. *On Propositions and the nature of Assent.*
- In the preceding sketch and defence of the Hartleyan philosophy, our ingenious coadjutor, though very ardently attached to this system, has very prudently omitted some of its most exceptionable parts, and touched others with so gentle a hand, as to guard, in a considerable degree, against the conclusions in favour of Materialism and the necessity of human actions, which other modern admirers of this system have deduced from it. The editor, professing his entire disapprobation of such conclusions, and his firm conviction of the existence of *mind* in the human frame as a substance essentially distinct from matter, and also of the freedom of the will, or the proper *agency* of man, must of course renounce those premises, respecting the mechanism of the mind, from which such inferences are drawn by a legitimate train of reasoning. His coadjutor's candour will require no apology for his annexing this declaration to the article, with which he has favoured him, and which, under certain limitations and restrictions, the judicious and discriminating reader will approve. Sentiments concerning the nature, faculties, and operations of the human mind, which the editor conceives to be no less true than important, will present themselves to the reader under the appropriate terms in different parts of this Cyclopædia; from which it will appear to be his aim to do ample justice to those writers, who have distinguished themselves in the department of mental philosophy: claiming for himself the privilege of forming his own judgment after due examination, though he may happen to differ from those who are held by their peculiar admirers
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and partizans in the highest estimation. "Audi alteram partem," and "Nullius addictus jurare in verba magistri," are the general maxims to which he has endeavoured to conform in the compilation of the Cyclopædia.

PHILOSOPHY, *Moral*, is that science which teaches men the nature and obligation of duty; in other words, it is "that science which teaches men their duty, and the reasons of it." This last definition is from archdeacon Paley; and it is only objectionable as including rather too much. The *precepts* of duty do not, as such, come under the head of moral *philosophy*: this is concerned with the *principles* from which the precepts are derived. The investigation of these principles, and the consideration of their mutual connections, will often lead the philosopher to state the rules of duty; but the preceptive part more properly falls under the head of ethics, or morals.

Paley does indeed say, that "*moral philosophy, morality, ethics, casuistry, natural law*, mean all the same thing, *viz.* that science which teaches men their duty, and the reasons of it;" but he is undoubtedly wrong. *Moral philosophy* is the *science* of morals: it investigates the grounds and reasons of duty; it traces that quality of actions and dispositions which renders them obligatory upon a reasonable being like man; it shews what clais of actions and dispositions possess this quality; it ascertains by this means the best rule of life; and it lays down those principles, by the aid of which the rule of life may be most successfully applied. The terms, *ethics* and *morals*, though correctly applied to the *science*, are more appropriate to the art of *morality*, (understanding by the word *art*, as opposed to science, a system of rules for the proper attainment of any end;) and, in this sense, the terms are not applicable to investigations respecting the grounds and reasons of duty, as such, though the *art* of morals can scarcely fail to include some reasoning respecting its foundation and principles, just as the *science* of morals can scarcely fail to include in some measure the preceptive part. *Morality* commonly refers to the quality of an action or disposition, which makes it the subject of reward or punishment; but it is also used, as when we speak of a system of morality, in reference to the art of morals. *Casuistry* has for its sole object the *difficulties* of duty; and classes sometimes with the *science*, and sometimes with the *art* of morals. It often requires subtle investigations, and nice and refined distinctions; and when it is not regulated by invariable attention to the grand principles of morality, it often leads to great intricacy and perplexity. Such discussions have indeed not unfrequently led, through the sophistry of vanity or self-justification, to opinions which confound all moral distinctions. The moral reasoner must have some fixed points of duty; and when he has seen that these have a solid foundation in the nature of the human mind, and the circumstances of man, he ought on no account to give them up. If any opinions are in clear opposition to them, the principles on which those opinions are founded should be regarded as absurd, if not practically dangerous. The term *natural law* denotes that system of duty, which is derived from considerations independent, or supposed to be independent, of divine revelation.

Great as the merits of Paley indisputably are, which lead us to rank him among the most useful writers whose works are now commonly read, precision is not one of his striking excellencies. If with his happy talent of illustration, his uncommon skill in selecting the leading and most impressive features of his subject, his general neatness of arrangement, perspicuity of expression, and animation and occasionally even playfulness of manner, he had united greater correctness of thought, and precision in the use of words, and if

he had never suffered himself to lower the standard of duty, in accommodation to the practice of those around him, his writings could scarcely have been improved. But all excellencies are not to be expected together; and what Paley has done entitles him to the respect and gratitude of the religious world. His work, entitled "*Horæ Paulinæ*," displays most originality and depth of investigation. His *View of the Evidences of Christianity* marks the soundness and clearness of his judgment. The *Natural Theology* has less precision and correctness, and often shews a want of acquaintance with the actual state of physical science, and natural history; and it has one important defect, it derives none of its evidence from mental philosophy, though this science affords to the reflecting mind numerous and striking proofs of the wisdom and goodness of God. But, with all its faults, it is a work of great interest and value, and deserves a series of notes for the purpose of illustration and correction, accompanied with unexpensive delineations of the leading objects of anatomy and natural history, which he refers to. As to his *Moral Philosophy*, the writer of this article, though not insensible of its real value, which is delineated in Paley's most happy manner in his preface, feels obliged to place it below the rest of his works. He has enlivened and familiarized his subject perhaps beyond example; he has made really profound investigations often appear simple, and even attractive; he has employed Christian sanctions and Christian principles, before too much neglected by the moral philosopher; and his morality is, in general, sound and comprehensive, and the explication of it alike interesting and impressive. But his system, in our opinion, is fundamentally wrong; and this error in the basis has, in some important cases, led the author himself to erroneous conclusions, and has produced this effect still more among his readers. Though we shall not have occasion to enter into any minute discussion of his system, this article will, we think, furnish the intelligent reader with principles, which will prevent the ill effects of his errors; and we shall, in several instances, have to acknowledge our own obligations to him.

In the statement which we made near the beginning of the second paragraph, respecting the objects of moral philosophy, we have, we perceive, given the basis of the plan which we shall follow in this article. After having offered a few more introductory observations, and some remarks respecting the necessity of moral investigation, we shall,

I. Consider the nature of moral obligation, and shew the ultimate obligation of duty.

II. We shall give a view of those conclusions respecting the primary pursuits of man, which are derived, under the guidance of divine revelation, from the laws of our frame, and the usual course of Providence.

III. We shall shew what criterion of virtue and principle of duty we deem, from the views in the second division, to be most suitable to the condition of human nature, and most likely to lead to its highest excellence. And,

IV. We shall offer some conclusions, which may serve in part as a basis for a system of practical morality.

We have already said (see *MORAL Education*, col. 4.), that our system of morality is Christian morality; and we trust that the influence of Christian principles will be traced throughout. If any one thinks he sees reason for the opinion, that the evidence of the divine origin of Christianity is not sufficiently stable; yet if he believes in the existence of a wise and benevolent First Cause, in his moral administration, and in a future state of retribution, he may still go along with us in almost all our conclusions: for though we deem divine revelation a most important means of knowing

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our duty, and the fancies with which it is attended of inestimable value, (even to those who might have been able to satisfy themselves of a future life by considerations solely derived from the frame of man, and the common course of providence,) yet our own conviction, confirmed by every re-examination of the subject, is, that the moral principles of the scriptures are precisely such as would have been established, independently of revelation, by an accurate and enlightened acquaintance with the laws of the human frame, and a judicious and comprehensive view of the consequences of human actions. Not that it is at all probable, that such a moral system as the Hartleyan rule of life, for instance, would have been devised by unaided human investigation. There is a wide difference between the *perception* and judicious *application* of a truth, and the *discovery* of that truth; and though it is comparatively easy for the enlightened understanding, setting out with a satisfactory conviction of an important moral truth, to shew its foundation and importance, so as to satisfy the less rigorous and comprehensive mind, yet, without that conviction, the effort would seldom be made; and the doubts and difficulties attending the inquiry would often damp the ardour and perseverance of the philosopher, or the intricacies of it would mislead him, and bring him to conclusions in direct opposition to the principle from which he set out. The most acute philosophers of antiquity were constantly at a loss, when they came to inquire into the grounds and obligations of virtue; and they repeatedly derived from their speculations, opinions which were hostile to the soundest views of human nature; and we have not been without instances in later times, where men of vigorous minds, unfettered, as they believed, by any prejudices, and daring to embrace what they supposed to be truth, even if they found her in the haunts of vice, and decked out in all her harlotry;—men, too, whose writings indicate an ardent love of virtue, and prove their obligations (little acknowledged, and perhaps scarcely perceived by themselves,) to the Christian system of duty;—having pursued their speculations without the restraint of any fixed points of morality, have derived, even from principles wearing the marks of true excellence, and only erroneous by their extravagant extension, conclusions alike hostile to the precepts of the gospel, to the plain sense of mankind, and to the actual condition of human nature. On one of these conclusions we shall have occasion hereafter to offer some remarks; and we shall only add in this connection, that even if the philosopher were himself successful in ascertaining the grounds, obligations, and extent of any moral principle, yet he would seldom succeed in cases of any intricacy, and especially in opposition to the selfish passions, to convince the less comprehensive mind, unless it were under the general influence of the belief that the principle itself, or those which are directly affected by it, are certainly true, because they are sanctioned by the authority of God.

If there be satisfactory reasons for the conviction, that the frame of nature owes its origin to a Being infinitely wise, powerful, and good, he must act most wisely, who, in his investigations into the reasons of what he sees, presumes that it has a wise and good end, if he could but find it out, and sets himself with humility and caution to discover it: and if that conviction be a good one, then must such a mode of enquiry be most conducive (as Hartley has well remarked) to the discovery of truth. And following up the same principle of investigation, we may add, that if the moral philosopher see reason for the conviction, that the Christian system of duty has the express sanction of divine authority, he will act most wisely, if he presume that its precepts have a solid foundation and wise and

good ends, and by the aid of his own experience and observation, and that of others, and by the light which a judicious acquaintance with our mental frame affords, aims to find out their foundation and tendency, and to trace their application: and if his conviction be a just one, he will necessarily be more successful in the ascertainment of important truth, than he could possibly be, if he pursued his speculations without such fixed points or fundamental principles, even if he brought to the inquiry an equal degree of vigour of mind and clearness and soundness of understanding, and, what is not less important, equally just and comprehensive views of human nature, and equal love of truth and duty. We must state it, however, as our full and decided conviction, that such just and comprehensive views of human nature would never have been ascertained, *a priori*, from the known laws of our frame; and that it was only a *religious* philosopher who would have traced out what Hartley has done, from the experience of other religious persons and from his own.

Such is our foundation; if any philosophical enquirer who does not possess the conviction of the wisdom, goodness, and moral administration of the Supreme Being, should look into these pages, we apprehend he will see little to satisfy him. To enter into the proof of those principles is out of our present province; and to the real philosopher, we can, with complete satisfaction, recommend the first, and, if he choose to go further, the second chapter of the second volume of the *Observations on Man*. If the study of that work, and of Paley's *Natural Theology*, do not remove his doubts and difficulties, we can only advise him to act upon the *possibility*, to say no more, that there may be a state of endless existence hereafter, and if so, a state of retribution; and to bear in mind, that since the nature of that existence must be of infinitely greater importance than any present good or evil, it is the part of true wisdom so to regulate his conduct and dispositions, that should he enter into that new state of being, though through the weakness of the human understanding (for which gracious allowance will assuredly be made by Him who "knoweth our frame,") he has widely erred on subjects of the highest moment, he may obtain the approbation of having faithfully used his lower degree of intellectual and moral light.

It may be expected by some, that because we have represented our moral views as Christian morality, we should enter into the consideration of the duties peculiarly Christian, arising from the possession of the Christian system of faith and practice, and derivable from no other source; this, however, we shall not do: not that we think it *altogether* out of our province, but because the preceptive part of morals is not our immediate object; because the duties which are peculiarly Christian, (though they may be shewn to be accordant with the frame of the mind and the circumstances of man,) can be ascertained only from the scriptures; and because the consideration of those duties would involve discussions of a directly controversial nature, which are unsuitable to the design of this work. We are not among those who think the distinctions of Christian belief unimportant. Religious error in its direct, or its indirect effects, on ourselves or on others, must be prejudicial: religious truth, taken in all its bearings, (the whole truth, and nothing but the truth,) must be beneficial; and we are fully satisfied, that indifference as to the peculiarities of religious belief, most commonly leads to indifference to religious truth altogether. But, in our apprehension, there is something beyond and above them; something in which every Christian who understands his religion

igion must agree with every other : and it is this which is the basis of our moral investigations. If in the estimation of any we do not go far enough, we shall be satisfied if the serious and liberal inquirer shall see reason to admit, that we are right as far as we do go. As to the bigot, whose narrow mind can allow the worth of no motives which are not immediately founded upon his own peculiar creed, and do not directly imply its truth, we are unfeignedly sorry for him, but cannot in the least go out of our way on his account.

For the satisfaction of the more candid, however, we will add, that we do not leave out of our practical system of morals, the regards due to the great "Mediator between God and man:" and we are fully satisfied, that the basis of the duty which we owe to him is laid down in the following pages. If he were, as to nature, truly God, whatever conclusions are derived from the scriptures, and from the laws of the human frame, respecting the affections and service due to God, will apply, with little variation, to him : if he were one of the creatures of God, and (whatever his rank in the scale of being) deriving all his powers from him, and in every way dependent upon him, but appointed by him to fill a most important station in his moral administration towards mankind, then the regards due to him are derived from our social and pious affections united; assuming, from that union, a directly religious character. *Faith* in him will then depend upon the proofs of his divine authority : *submissive obedience*, upon the principle of religious obedience to his God and Father ; *reverence*, upon the impressive testimonies which he received of the peculiar favour of God, upon the importance of his work while on earth, and the high dignity and power to which he has been exalted : *esteem* and *veneration* will be founded on the moral likeness he bore to the Supreme object of veneration : affectionate and moving *gratitude* upon the contemplation of the blessings in the communication of which he was the agent, and of his labours and sufferings to assure and extend them. Except, on the one hand, in the external service due to him, and, on the other, in the affections founded upon the nature of his sufferings, there is less difference in the complex feelings termed love to Christ (if at all regulated by scriptural representations,) than is generally imagined ; and in all their practical results, (provided again, these are guided by the plain declarations of the scriptures,) they completely agree. We hope we shall not be supposed to have forgotten our object. To what we have said in this paragraph, we have been led by the desire of removing unnecessary prepossessions from the mind of any serious Christian enquirer.

To conclude these preliminary observations ; since much of the happiness of this life, and of our ability to benefit others, and since the happiness of a boundless existence, on the whole, depends upon the proper regulation of our conduct and affections, surely it must be an object of the first importance that we should learn the regulation to which they should be submitted. To know our duty, and to practise it, are indeed two distinct things, but to practise our duty well, certainly requires that we should know it well.

How shall we know it ? Shall we consult the law of the land, or make the general conduct of mankind our guide ? Shall we bend our actions implicitly and constantly to the rules of holy writ, or follow invariably the dictate of our consciences ? All these are of use in their degree, some are of inestimable value ; but they do not supersede the necessity of moral investigation.

The *law of the land*, to adopt the ideas of Paley, labours

under two defects, considered as a rule of life. *First* : human laws omit many duties, because they are not objects of *compassion* ; such as, piety to God, bounty to the poor, forgiveness of injuries, education of children, gratitude to benefactors. The law never speaks but to command, nor commands but where it can compel : consequently those duties which, by their nature, must be voluntary, are left out of the statute book, as lying beyond the reach of its operation and authority. *Secondly* : human laws permit, or, which is much the same thing, leave unpunished many crimes, because they cannot be settled by any previous description ; such as luxury, prodigality, partiality contrary to the good of others, &c. For it must either settle the crime to be punished, or leave it to the magistrate to settle it : which is in effect leaving the magistrate to punish or not to punish at his pleasure. (See Paley, book i. chap. 3.) Besides, as Mr. Belsham adds, (Elements, p. 418.) if the law of the land require any thing which the law of God forbids, disobedience is not only innocent, but our duty.

The *general conduct of mankind* cannot, to any great extent, be a safe guide. Scarcely is there a vice for which we may not find a justification in the general conduct of large societies ; scarcely a disposition, however pernicious to individual happiness, which may not receive confirmation from its allowed indulgence among whole nations. The bulk of mankind do not possess those advantages which enable persons of cultivated minds to see, almost at a glance, the path of duty. What culture they have is often unskillfully applied, and therefore bad habits gain strength, and false notions of honour, pleasure, and interest, occupy their minds : they think less of what is right than of what will not expose them to punishment ; and their conscience is seldom consulted, even where its decisions would be right. Nevertheless, a rule of life founded upon the general practice of mankind in the aggregate, would on the whole be favourable to virtue. It would indeed exclude all eminent degrees of virtue as well as of vice ; but it would also lay some restraint upon that violence and exorbitancy of passion and appetite, which is one chief source and occasion of vice. The *opinions* of mankind are, on the whole, more favourable to virtue than their practice, being, in general, formed from experience, and often upon mature deliberation, when free from the violent impulses of their appetites and passions. Like their practice, the opinions of mankind in the aggregate would exclude all eminent virtues, but in a weaker manner ; and it would exclude the great vices in a stronger manner. (See Hartley, vol. ii. prop. 46—49.) In the last he argues, that the Rule of Life, drawn from the practice and opinions of mankind, corrects and improves itself perpetually, till at last it determines entirely for virtue, and excludes all kinds and degrees of vice. The whole of the propositions referred to, especially the 48th, we recommend to the consideration of those who give themselves up to vicious courses, under the plea of "cool rational scepticism, and uncertainty in religious matters."

To the *rules of the scriptures* we may indeed implicitly submit. He who steadily cultivates the dispositions which Christianity enjoins, and conforms his conduct to its sacred precepts, cannot fail to mount high in the scale of moral worth. But this does not prevent the value of moral investigation. For in the *first* place, it gives greater promptitude to our obedience, to perceive that the Christian principles and precepts are in perfect consistency with the laws of human nature, and that an acquaintance with those laws leads us to the conclusions forced upon us by the scriptures, that it is our duty to make the love of God, the love of our neighbours, and the law of our hearts, the guide of our actions,

tions, and of our affections. But, *secondly*, the precepts of Christianity are very general. This is absolutely necessary to render them of use as the guide of life. Were they as voluminous as the laws of England, and the decisions of the supreme courts of justice, (which are said to fill at least fifty folio volumes,) they could not contain all the cases that would occur; for "it is not once in ten attempts, that you find the case you look for in any law book whatever; to say nothing of those numerous points of conduct, concerning which the law professes not to prescribe or determine any thing." (Paley.) Were the rules of scripture equally particular, they would be useless from their extent; and they would be injurious too, because they would prevent the reference of our actions to the general principle, and we should be satisfied if our case were not stated in the Christian system of morals. Again, *thirdly*, it follows from the Christian precepts being so general, and principally regarding dispositions, that it not unfrequently requires some consideration to ascertain where they are directly applicable, and still more whether they altogether coincide with one another in their direction. The virtuous dispositions may dwell together without opposition; a man may be generous, grateful and just: but the actions to which each prompts, may not have that consistency with one another, which would permit their being brought into exercise together; thus an external action which generosity and gratitude may solicit, justice may forbid. Hence it is of great importance to be able to form such a set of decisions, or still better such principles for decision, as might present themselves when called for, and prevent us from giving each class of virtuous actions a disproportionate attention;—such as should enable us to decide, when circumstances required it, to which class of virtuous actions our preference should be given, where we ought to restrain the impulse of feeling, and where to allow it to be our unhesitating guide. Besides, *fourthly*, again to use the words of Paley, "the scriptures commonly pre-suppose in the persons to whom they speak, a knowledge of the principles of natural justice; and they are employed, not so much in teaching *new rules* of morality, as in enforcing the practice of it by *new sanctions*, and by a *greater certainty*: which last seems to be the proper business of a revelation from God, and what was most wanted." See Paley, b. i. chap. 4.

But it may be thought that there is a principle in the human mind, which altogether supercedes the necessity of moral investigation; which infallibly directs us to our duty even in the most minute circumstances. We know of no such principle. We know that there is a principle which springs up, more or less, in the mind of every human being, and which approves of, and prompts to, certain actions and dispositions, and disapproves of, and urges to shun, the contrary actions and dispositions; but we see no ground to imagine that the conscience is to be regarded in the light of a blind instinct, or a mere sense: this would degrade the moral actions of man to a level with the instinctive actions of the brute, or with mere appetite; and it is unnecessary to resort to the supposition; the existence of the conscience, its variations, and its effects, can be accounted for without it. See PHILOSOPHY, *Mental*, IV, 7 (6), and *Moral Education*, III.

But in whatever light we regard the conscience, one thing is indisputable, that its dictates are not uniformly the same in any one, and that they are exceedingly variable in different individuals, even with respect to the grand principles of duty, and still more with respect to the application of those principles. It is indisputable that the moral principle grows to maturity from a small seed. It is indisputable that it is susceptible of culture; that, if neglected, its judgments

become wavering and impotent; that if its dictates be made to undergo revision, if corrected by the means of the knowledge we possess, if its defects are supplied by the more extended views of duty, its decisions proportionally become more firm, and in general more efficacious. See Paley, b. i. ch. 5.

Even an ardent desire to keep with exactness the best rules of duty, will not render attention unnecessary to the cultivation of the conscience; ("I verily thought with myself," said the apostle Paul, "that I ought to do many things contrary to the name of Jesus of Nazareth;") and an enlightened love of duty must, therefore, urge to such cultivation. Dr. Cogan, in his Philosophical Treatise on the Passions (p. 348.), adduces as an example "of the influence of perverted principles," "the conduct of a pious mother, towards a most excellent and dutiful son, who, from a principle of conscience, in opposition to his interests, renounced the religious system in which he had been educated, for another which he deemed more consonant to truth. She told him, that 'she found it her duty, however severe the struggle, to alienate her affections from him, now he had rendered himself an enemy to God, by embracing such erroneous sentiments.' My friend added, that she was completely successful in these pious endeavours; and that the duty which she enjoined upon herself, was scrupulously performed during the remainder of her days." The same philosophic writer mentions another instance of the irregularity of the moral principle in a child, in whose character mildness and compassion were pre-eminent features. "I was once passing through Moorfields," he says, "with a young lady, aged about nine or ten years, born and educated in Portugal, but in the Protestant faith; and observing a large concourse of people assembled around a pile of faggots on fire, I expressed a curiosity to know the cause. She very composedly answered, I suppose it is nothing more than that they are going to burn a Jew."

It is surely unnecessary to say more on these points. It is a truth, as indisputable as that we are living for a purpose beyond mere present gratification, "that moral excellence is the true worth and glory of man, and that therefore the knowledge of our duty is to every man, in every situation of life, the most important of all knowledge." Reid.

The leading questions in morals may be reduced to the three following: 1. What is that quality of conduct and affections, or character, (the sum total of the moral habits of feeling and action,) which render them obligatory upon a reasonable being constituted like man? 2. What are those affections, and classes of conduct, which possess this quality? 3. What are the best means for the culture of those affections, and the proper direction of our conduct? The first of these we shall now proceed briefly to consider.

1. *Moral obligation*.—The term *obligation* respects *voluntary* actions only. We use the word *actions* as Mr. Stewart does (Outline, p. 76.), to include every mental or corporal exertion consequent on volition. We say we are *obliged* to walk, if we wish to have health; we are *obliged* to use regular exertion, if we wish to acquire valuable mental habits; and, generally, we are *obliged* to perform certain actions, in order to attain certain ends. The use of the term in this and similar situations, shews its true import. *Obligation* expresses the *necessity of certain voluntary actions as means*, in order to obtain certain ends. Thus, if the end be the possession of health, a *necessary* means is that we take exercise. If the end be the formation of valuable mental habits, a regular series of exertions is the *necessary* means; and, in short, in whatever case we wish to express that certain ends can only be obtained by certain voluntary actions as the means,

we say we are *obliged* to use these means in order to obtain these ends. This simple and truly excellent view of obligation is taken, with a little alteration, from Mr. Belsham's Elements, sect. 4. It seems to have been derived from Gay's Preliminary Dissertations, sect. 2; but with great improvement. In its present form it best accords with our object.

*Obligation* differs from *compulsion*. The former respects *voluntary* actions, the latter *involuntary*. Compulsion always implies some external force. Thus a man is obliged in honour to pay his debts, and if he do not he will be compelled by the law; that is, if to satisfy the laws of honour be the end, the payment of his debts is the necessary means; if this obligation do not operate with sufficient strength as a  *motive*, he will be compelled to do it, against his will, by the law.

*Obligation* by no means implies an *obligor*. I may be obliged by reason, by interest, by convenience, by honour, by conscience, &c. as well as by the authority of another. Authority is one, but not the only, source of obligation. Paley's opinion, that "a man is said to be obliged, when he is urged by a violent motive resulting from the command of another," (separate from the very objectionable expression *a violent motive*;) is by far too limited an account of obligation.

*Moral obligation* respects those actions which are denominated virtuous or vicious; we are *obliged* to perform the one, and to abstain from the other, because this is the *necessary means*, in order to effect a certain end. That is to say, unless we do practise virtue and abstain from vice, we cannot obtain the end which wisdom points out as deserving pursuit.

As has been remarked of obligation in general, there may be *various sources* of moral obligation; thus, a person may be obliged to the performance of his duty, by the laws of God, the dictates of his conscience, his greatest happiness on the whole, and so on. Whatever can be shewn to be the *ultimate* obligation, that is, that to which all others may be reduced, will then furnish the most general *criterion* of duty; we do not say the *best*, for that we think a different one. (See Div. III.) Thus, if it appear that the *ultimate* obligation to virtue is the agent's *greatest happiness on the whole*, then we should say, that *virtue* is that quality of an action, or affection, or of the characters by which it tends to the greatest happiness of the agent on the whole. In other words, a certain character of action or disposition, is a necessary means to a certain end; that end may be various, according as we go back more or less remotely; suppose the remotest end to be the greatest happiness of the agent on the whole, then it follows, that the *tendency* to produce that end, is, philosophically speaking, the most general criterion by which we are to ascertain whether or not it is *obligatory*; and to this tendency may be given the denomination of virtue.

Many sources of obligation have been pointed out by different philosophers. That is, to the question, Why ought I to act in a certain way, which we call *virtuously*, many answers have been given. Some of the most important are the following.

It is agreeable, say some, to the *eternal and necessary fitness of things*. This, in a great measure, leaves the distinction between virtue and vice, indefinite and arbitrary; for it depends upon the *perception* of a fitness or unfitness, which can only be ascertained by investigations, whose conclusions will necessarily, and often widely, differ in different individuals. Besides, as it has with some justice been asked, what are those moral fitnesses fit for? If the fitness or unfitness of actions mean any thing different from their ten-

dency to produce happiness or misery, the expression is unintelligible. We may safely use the expression, for there are certainly a beauty and propriety in virtue, a suitability to the nature and condition of man, which increase in our estimation as virtue itself gains an influence in our breasts; but still, when we speak of it as a source of moral obligation, 'we find the question returning, Why ought I to act agreeably to the fitness of things?' The principal supporters of this view of moral obligation are, Grotius, Balguy, and especially Clarke. To a certain extent, it is also defended by the advocates of the next opinion.

Some whose own confirmed habits of virtue probably were in some measure the cause of the opinion, have maintained, that virtue carries in itself its own obligation,—that *the understanding at once perceives* a certain action, *to be right*, and that *therefore it ought* to be performed. It is objected with great justice to this system, that it leaves the matter where it found it; for the question recurs, why am I obliged to perform an action which my understanding represents to me as right? Again you tell me, my understanding represents such an action as right, that is, obligatory; and therefore I am obliged to perform it. I may ask, *why* does your understanding represent this as right? If you say, because the mind is so constituted by its Maker, you refer me to a kind of infallible judge within, whose dictates, nevertheless, are very different in different persons.—Besides, if the *perception* of right constitutes obligation, we must admit that persons sometimes do right in performing wrong actions. Felton believed that he did what was right, that in short he performed an action which was highly meritorious, when he murdered the duke of Buckingham; according to this theory, he was really under an obligation to do it. There cannot be a doubt, that it is the part of true wisdom to endeavour to cultivate the moral powers, and then leave the actions entirely, (except in extreme cases,) to their suggestions. But to state that an action is obligatory, *because* the understanding, or the moral sense, (for it comes to the same thing,) represents it as right, is to sanction, as virtuous, some of the most injurious actions; for some of the most injurious actions have been performed by those who thought it right to perform them. The fact appears to be, that the advocates for this system, having spent much of their lives in cultivating their moral perceptions, and finding them, in their present state, always correct, have acquired the habit of acting implicitly upon them, and hence (not remembering their less perfect state) have judged, that because certain actions were represented by the moral perception as right, *therefore* they were obligatory. This is a sufficient obligation, where persons have done their best to enlighten their consciences, generally, and in the particular point of difficulty, but not otherwise; and the question still recurs, *why* is this action obligatory? This source of moral obligation was maintained by Cudworth, Butler, Adams, and Price; men whose writings display talents of the first order for profound investigation; and whose errors are the errors of confirmed moral worth, viewing their own minds rather than the actual condition of human nature, and unacquainted with some of the grand principles of the mind, which would have led them to different conclusions. Perhaps the works of Butler and Price do not suit the taste of the present age; but the intelligent reader can scarcely rise from the study of them, without moral and intellectual benefit.

An action is obligatory, say others, because it is agreeable to the *moral sense*. The observations under the last head have anticipated what might be made here. When we analyse the grounds of our moral feelings and sentiments, (see PHILOSOPHY, *Mental*;) we cannot but perceive, that they

they cannot be safely made the infallible rule of our conduct; still less can they furnish the ground of obligation. It cannot, however, be too strongly impressed upon the mind, that correct dictates, and the exaction of implicit obedience to those dictates, constitute the perfection of the conscience. Enlighten and obey it, is a maxim of true wisdom. Lord Shaftesbury and Dr. Hutcheson are the principal supporters of this theory. Adam Smith's hypothesis nearly coincides with it. See Bellham's Elements, p. 428.

It is clear, then, that we do not reach the ultimate obligation by saying that it is agreeable to the eternal fitness of things, to the perceptions of the understanding, to the dictates of the moral sense; but when we add, it is agreeable to the will of God, we seem incapable of advancing further. We surely are obliged to perform the will of God, by every consideration. Most true, and yet we are not come to the remotest obligation. Even, in the sentence we have just used, we have, without intending it, referred to one beyond it. Under the moral administration of an all-wise and gracious being, there cannot be a doubt, that obedience to his commands is the highest wisdom: but why? It is a question that admits of an answer, and may therefore be put, though reverently: why am I *obliged* to do the will of God? And the answer is obvious. Obedience to the commands of a benevolent God must be productive of the agent's greatest happiness on the whole. Not that it is necessary frequently to take this into consideration; for when we have ascertained that we are walking surely, we may walk safely without that degree of attention which, before such ascertainment, might have been necessary. To obey the will of God in all things is the highest point of wisdom; and the consequences of obedience we may leave to him with perfect security. It must be well with those who fear him. For references to the writers who have deduced all moral obligation from the Deity alone, see Thomas Cooper's Tracts, Essay on Moral Obligation, where will be found an acute examination of the foregoing and other views of moral obligation. See also Bellham's Elements at the end. Mr. Bellham has extended the examination to the moral systems of Paley, Gisborne, and Godwin.

Every question, Why is any one obliged to perform a certain action? gives us an ultimate answer; because it tends to the agent's greatest happiness on the whole. When we arrive at this point, it is obvious that we can go no further. And though, as will hereafter appear, true wisdom undoubtedly directs, that in order to attain the highest degree of moral excellence, we should leave our own happiness out of consideration,—and though the human mind is so constituted, that disinterested benevolence, founded upon and supported by piety, would lead an individual who has attained it, to obey the will of God and seek to promote the welfare of mankind, even if his understanding were convinced that he should thereby entail upon himself consequences highly prejudicial to, or destructive of happiness on the whole,—yet it does not appear that there could be any proper *obligation* to any conduct in opposition to the agent's happiness on the whole. If self *must* be annihilated, it is because self-annihilation, or self-oblivion, is necessary for the attainment of the highest possible happiness. It has been remarked in favour of this as the *ultimate* obligation to virtue, that no nearer obligation could ever be admitted, which cannot at last be resolved into this most remote one: that no one, if he had his choice, would accept of existence but upon condition of a preponderance of happiness; that happiness is the end of the whole creation, though the means by which it is to be obtained are not always in themselves

considered productive of happiness; and that revelation assumes this as the ultimate sanction of all its requisitions. This view of moral obligation is ably defended by T. Cooper in the first of his tracts: his statements, however, are sometimes deficient in that reverence which should ever be maintained to the Supreme Being; there is an occasional vagueness, or rather inaccuracy, in his expressions; and in some instances we see more indications of acuteness than of solidity. It is less exceptionably and more compendiously considered and maintained in Mr. Bellham's Elements. It is stated by Cooper (p. 86.) to have been entertained by Cumberland, Puffendorf, Gay, Law, Turnbull, Rutherford, Clayton, Johnson, and others; Bellham adds Browne and Gisborne; and Paley (see b. ii ch. 2.) may evidently be arranged among them. On this and every other point of morals, however, our decision must be founded on something more secure and satisfactory than human *authority*.

Here, then, we come to the ultimate, or (as we should prefer saying) the *remotest* obligation of virtue; and from this point we shall proceed, till it appears that the ends of human existence will be best answered by resting at a somewhat nearer and equally stable ground of obligation. And we cannot forbear anticipating the conclusions from the next division, by observing, that it will clearly appear, from carefully considering the laws of our mental frame and the circumstances of mankind, that the love of God, of man, and of duty, (in other words, the affections of piety and benevolence, and a regard to conscience,) should be our primary aim, since he will be most happy, in whom those principles exist with the greatest strength and vigour. The *ultimate obligation*, the *best rule*, and the *immediate motive*, of duty, are three distinct considerations. If it appear that to make the will of God our *rule* of duty, is the *best* way to promote our own worth and happiness, as well as the worth and happiness of others, this must be our *best rule*: we may, nevertheless, be acting in perfect consistency with this rule, when we are exerting ourselves for the good of others, or imposing restraints upon our selfish inclinations, with an explicit intention to promote the welfare of others, or to follow the dictates of conscience, without, for the time, any direct reference to the will of God as such; benevolence, or a sense of duty, is in this case our *immediate motive*. The remotest obligation in this case, is the same as before; but we can seldom find it necessary, even in theory, to revert to it as the ultimate obligation; for if God is just and good, obedience to his will must be productive of our greatest good on the whole. He is perfectly just and good, and therefore, in the actual state of the case, and we need think of no other, the will of God may, with the utmost propriety, be assumed, not only as the noblest *motive*, and the best *rule*, but also as the *foundation*, and even (with very little departure from logical correctness, and with greater accordance with the feelings of the man who is accustomed to employ this rule) as the *ultimate obligation* of duty. He perhaps perceives, when he comes to discriminate nicely, that he *may* go one very short step farther; but religious obedience and his greatest good, appear to him so inseparably connected as cause and effect, that they make a part of one complex idea; so that when he is acting under a sense of religious obligation, he feels a security, if he think at all about it, that he is effectually promoting his own greatest happiness on the whole. But he wishes to feel and act as little as may be with an explicit regard even to this highest species of self-interest, as a primary consideration; and therefore when he has come to the will of God, he cheerfully rests with that, as his farthest obligation.

II. *Consideration of the Primary Pursuits of Man.*—According

ording to the plan proposed near the beginning of this article, we shall now proceed to consider what should be made our primary pursuits in life, in order to obtain the greatest degree of happiness on the whole; in other words, according to the second inquiry at the end of our introductory observations, what are those affections and classes of conduct which possess the quality which renders them obligatory upon a reasonable being like man. In answering this inquiry, the third will, also, in a considerable degree, receive an answer, *viz.* what are the best means for the culture of those affections, and the proper direction of our conduct.

In this division we shall make a free and almost continual use of Hartley's Rule of Life. We do not think it necessary to make any point of stating where we extract or abridge from him, or where we leave him; those who are acquainted, or who may be led by what we here state to an acquaintance with that part of his Observations, will easily perceive what we owe to him; and to others it would be useless. We do ourselves pay no regard to his authority, farther than where it appears to us he has reached moral truth; and we ask for no one's adoption of any statement he may find here, *because* it is Hartley's; but we shall deem ourselves happy, if our present labours should lead any to cultivate an intimate acquaintance with that invaluable treasury of moral principles.

Hartley's Rule of Life follows the arrangement of the pleasures and pains in the first part of his Observations; and we shall pursue the same order. It was greatly with a view to this, that we entered so much into his analysis of the mental pleasures and pains in our preceding article (*PHILOSOPHY, Mental, IV. 7.*), and we must beg the reader to refer, under each class, to the corresponding section there. The primary division of the pleasures and pains is into the sensible and the mental or intellectual; and these last are divided by Hartley into those of 1. IMAGINATION; 2. AMBITION; 3. SELF-INTEREST; 4. SYMPATHY; 5. THEOPATHY; and 6. Those of the MORAL SENSE.

1. *Estimate of the Pleasures of Sensation.*—The first pleasures and pains of the human being are obviously those of sensation, and they form one source of enjoyment, and still more of suffering, during the whole of life. It is from these that the whole round of mental or intellectual pleasures and pains is composed. (See *PHILOSOPHY, Mental, II. IV.*) To estimate the value of these pleasures in their uncompounded state, take the extreme case, that any one pursued them as a primary object, laying aside all restraint from the virtues of temperance and chastity; he would soon destroy his bodily faculties, thus rendering the objects of the sensible pleasures useless; and he would precipitate himself into pain, diseases, and death, evils of the first magnitude in the eyes of the voluptuous. This is a plain matter of observation, verified every day by the sad example of loathsome, tortured wretches, that occur which way soever we turn our eyes in the streets, in private families, in hospitals, in palaces. Positive misery, and the loss even of sensible pleasure, are too inseparably connected with intemperance and lewdness, to leave room for doubt even to the most sceptical. The sensual appetite must therefore be regulated by, and made subservient to, some other part of our natures, else we shall miss even the sensible pleasure which we might have enjoyed, and shall fall into the opposite pains, which are, in general, far greater, and more exquisite than the sensible pleasures.

The same conclusion also follows from the fact, that inordinate indulgence in sensual gratifications, destroys the mental faculties, exposes to external inconveniences and pains,

is totally inconsistent with the duties and pleasures of benevolence and piety, and is all along attended with the secret reproaches of the moral sense, and the horrors of a guilty mind. Such is the constitution of our frame, that the formation of mental feelings and affections cannot be altogether prevented; but an inordinate pursuit of sensible pleasures converts the mental affections into a source of pain, and impairs, and cuts off, the intellectual pleasures.

The same thing may be inferred from the fact, that the sensible pleasures are formed first, and the mental pleasures from them, by the associative power. Now it is a general principle in the order of nature, that the prior state, or means, is less perfect and important than the posterior state, or the end. Hence the sensible pleasures cannot be of equal value and dignity with the mental, to the generation of which they are made subservient. This inference may be drawn from the analogy of nature, without reference to the infinite benevolence of the Supreme Being, which, however, makes it more satisfactory.

Further, the mental pleasures are more consistent with the gentle gradual decay of the body, than the sensible pleasures, because, as they are formed from the combination and coalescence of many sensible pleasures, they more affect the sensible system at large; while the sensible pleasures principally affect the particular parts of the system to which they belong, and therefore, when indulged to excess, they injure or destroy their respective organs, before the whole body comes to a period.

Lastly, the duration of mere sensible pleasure is necessarily very short, and cannot, even when free from guilt, afford any pleasing recollections; whereas one of the principal pleasures of our nature, is, and must be, the pleasures of reflection and consciousness. In like manner the evident use and restriction thereto of one of the chief sensible pleasures to preserve life and health, with all the consequent mental faculties, and executive bodily powers; of the other to continue the species, and to generate and enlarge benevolence, make the subordinate nature of both manifest in an obvious way.

2. *Regulation of the Pursuit of the Pleasures of Sensation.*—The foregoing remarks prove that the pleasures of sensation ought not to be made the primary pursuit of life, but require to be regulated and restrained by some foreign regulating power. That they should be submitted to the precepts of benevolence, piety, and the moral sense, may be proved by shewing, that by this means they will contribute both to their own improvement, and to that of other parts of our nature.

Now benevolence requires that the pleasures of sense should be made entirely subservient to health of body and of mind, so that each person may best fill his place in life; best perform the several relative duties of it; and as far as in him lies, prolong his days to their utmost period free from great diseases and infirmities. All gratifications, therefore, which tend to produce diseases of body or irregularities of mind, are forbidden by benevolence; and the most wholesome diet, as to quantity and quality, enjoined by it. It also most strictly forbids all gratifications by which the health or virtue of other individuals is injured, or by which encouragement is given to others to depart from the rules of chastity and temperance. The precepts of piety are to the same purpose, whether they are deduced from our relation to God, as our common Father and Benefactor, who wills that all his children should use his blessings so as to promote the common good; or from the natural manifestations of his will in the immediate pleasures and advantages arising from moderate refreshment, and the manifest inconveniences

and injuries caused by excess in quantity or quality; or from his revealed will, by which temperance in all sensible pleasures is commanded, and intemperance severely threatened. In like manner the moral sense absolutely directs to the same moderation, whether it be derived explicitly from the foregoing rules of benevolence and piety, or from ideas of decency, rational self-interest, the practice of wise and good men, the disgusting nature of the diseases consequent on intemperance, the odiousness and mischief of violent passions, &c. It is evident, therefore, that all these guides of life lead to the same end, *viz.* great moderation in sensible enjoyments, though they differ somewhat in their motives, and in the commodiousness of their application, as a rule in the particular occurrences of life.

By this steady adherence to moderation, we are no losers, even with respect to sensible pleasures themselves; for by these means our senses and bodily powers are preserved in their best state, and as long as is consistent with the necessary decay of the body; and this moderation, and its beneficial consequences, directly tend to inspire the mind with perpetual security, cheerfulness, and good will, and with gratitude to the Giver of all good. In the common intercourse of life, associated circumstances add greatly to the pleasures of sensation: thus the pleasure of receiving a thing from a friend, or sharing it with a friend, sociality and mirth at the time of enjoyment, &c. greatly enhance the gratifications of taste. Much more than will the pure and exalted pleasures of piety and benevolence increase these pleasures.

We are then great gainers on the whole, by religious moderation as to sensible pleasures; still more so as to the sensible pains and sufferings which the intemperate bring on themselves. These are of the most exquisite kind, and often of long duration, especially when they give intervals of respite; they impair the bodily and mental powers so as to render most other enjoyments insipid and imperfect; they dispose to peevishness, passion, and murmuring against Providence; and are attended with the pangs of a guilty mind.

On the whole, the proper method of avoiding the sensible pains, whether the result of excess, or such as occur in the daily discharge of the duties of life, and of obtaining the sensible pleasures in their best and most lasting state, is not to aim at either directly, but in every thing to be guided by the dictates of benevolence, piety, and the moral sense. It is evident that luxury, self-indulgence, and an indolent aversion to perform the duties of a man's station, not only bring on gross bodily diseases, but previously to this, often produce such a degree of anxiety and fearfulness in minute affairs, as to make persons inflict upon themselves greater torments than the most cruel tyrants could inflict. There are cases, however, in which persons are obliged, from a sense of duty, from benevolence, from adherence to true religion, &c. to forego pleasure, and to endure pain; and this where there is no probability of a recompense in this life. Here the hopes of futurity lend their aid, and the present pleasure which these afford, is in some cases so great, as to overpower, and almost to annihilate, the opposite pains.

3. *Rules respecting the Pleasures of Sensation.*—"The only rule with respect to our diet," says Dr. Priestley in his Institutes, "is to prefer those kinds, and that quantity, of food, which most conduce to the health and vigour of our bodies. Whatever in eating or drinking is inconsistent with, and obstructs this end, is wrong, and should carefully be avoided; and every man's own experience, assisted with a little information from others, will be sufficient to inform him what is nearly the best for himself in both these respects, so that no person is likely to injure himself through mere mistake."

It is sufficiently obvious, that it is the benevolent affections which give the chief value and highest interest to the sensible pleasures, arising from the intercourse of the sexes; and it also appears that these pleasures were designed by the great Author of our frame to be one chief means of transferring our affection and concern from ourselves to others. If, therefore, this great source of benevolence be corrupted or perverted, the social affections depending on it will also be perverted, and degenerate into selfishness or malevolence. These considerations, of themselves, point to marriage as the only justifiable mode of indulging the social passions.

Unrestrained promiscuous intercourse would produce the greatest evil public and private. By being unrestrained, it would destroy the health and prevent the propagation of the species; by being promiscuous, it would be ineffectual to promote the tender and benevolent charities, either between the individuals themselves, or towards their offspring, and would produce endless contentions among mankind. Now though scarcely any known nation has allowed of such entire licentiousness, yet the evils arising from any great degree of it are so abundantly obvious and important, that they have almost universally led to some such regulation of sexual intercourse as that of marriage, and prove its necessity for the well-being of society.

Further, to use the words of Paley, already cited under the article MARRIAGE, whose excellent remarks on this subject we shall freely employ as suits our purpose, the public use of marriage institutions also consists in their promoting the production of the greatest number of healthy children, their better education, and the making of due provision for their settlement in life; and their promoting the private comfort of individuals, and particularly of the female sex. It may be true, all are not interested in this last reason; nevertheless it is a reason to all for abstaining from any conduct, which tends in its general consequence to obstruct marriage: for whatever promotes the happiness of the majority is binding upon the whole.

These considerations prove that the restraint of marriage institutions is an essentially important obligation. It may be violated by vagrant concubinage, or by cohabitation limited to a single individual. The former will be the object of the next paragraph; the latter cannot be placed upon the same footing with it in several respects: but as it can answer the primary public ends of marriage in only a few cases, as it tends to annihilate the individual advantages which are naturally derived from it, both as to moral welfare and to comfort; and as it decidedly discourages marriage, and consequently in the present state of society countenances fornication, it follows that it is immoral. "Laying aside the injunctions of the scriptures," says Paley, "the plain account of the question seems to be this: it is immoral, because it is pernicious that men and women should cohabit, without undertaking certain irrevocable obligations, and mutually conferring certain civil rights; if, therefore, the law has annexed these rights and obligations to certain forms, so that they cannot be secured or undertaken by any other means, which is the case here, (for whatever the parties may promise to each other, nothing but the marriage ceremony can make their promise irrevocable,) it becomes in the same degree immoral, that man and women should cohabit without the interposition of these forms."

With respect to the crime of fornication, it is to be observed that promiscuous concubinage tends greatly to discourage marriage, and therefore to defeat the several beneficial purposes spoken of in the preceding paragraph. The

reader will learn to comprehend the magnitude of this mischief, by attending to the importance and variety of the uses to which marriage is subservient, and by recollecting that the malignity and moral quality of each crime are not to be estimated by the particular effect of one offence, or of one person's offending, but by the general tendency and consequence of crimes of the same nature. If one instance of licentious indulgence be innocent or allowable, why should not more? and if allowable in one, why should not licentiousness become general? and if it were so, what dreadful consequences would follow? Every instance of licentious conduct has the direct and decided effect of leading to those dreadful consequences, which none but a purely malevolent being could contemplate without horror; and every instance is therefore criminal, altogether independent of its individual effects and tendencies.

Again: fornication supposes prostitution, and prostitution brings and leaves the victims of it to almost certain misery. It is no small quantity of misery in the aggregate, which between want, disease, and insult, is suffered by those outcasts of human society who infest populous cities; the whole of which is a general consequence of fornication, and to the increase and continuance of which every act and instance of fornication contributes.

Further: fornication produces habits of ungovernable lewdness, which introduce the more aggravated crimes of seduction, adultery, violation, &c. Of this passion it has been truly said, that irregularity has no limits; that one excess draws on to another; that the most easy, therefore, as well as the most excellent way of being virtuous, is to be so entirely. However it be accounted for, the criminal intercourse of the sexes corrupts and depraves the mind and moral character, more than any single species of vice whatsoever. That ready perception of guilt, that prompt and decisive resolution against it, which forms one grand feature in a virtuous character, is seldom found in persons addicted to these indulgences. They prepare an easy admission for every sin that seeks it; they are, in low life, usually the first stage in men's progress to the most desperate wickedness; and, in high life, to that lamented dissoluteness of principle, which manifests itself in a profligacy of public conduct, and a contempt of the obligations of religion and moral probity. Add to this, that habits of libertinism incapacitate and indispose the mind for all intellectual, moral, and religious pleasures, which is a great loss to any man's happiness.

Lastly: fornication perpetuates a disease, which may be accounted one of the forest maladies of human nature, and the effects of which are said to visit the constitution of even distant generations. The passion being natural, proves that it was intended to be gratified; but under what restrictions, or whether without any, must be collected from such considerations as the foregoing. And we must hint here, that the gratification of it in any way but by sexual intercourse, is not only directly and expressly forbidden by the laws of God, (and even, in some instances, of man,) and by general consent branded with shame and infamy, but leads to consequences in the bodily and mental system alike mischievous and irremediable. See § 2.

If fornication be criminal, all those incentives which lead to it are accessaries to the crime, and, as such, are criminal, independently of their injurious effects upon the mind, which, however, are very great: for instance, lascivious conversation, whether expressed in obscene, or disguised under modest, phrases; also wanton pictures, songs, and books, the writing, publishing, and circulating of which, whether out of frolic, or for some pitiful profit, is productive of so

extensive a mischief, from so mean a temptation, that few crimes, within the reach of private wickedness, have more to answer for, or less to plead in their excuse.

Though the sexual desires are very strong, yet there is abundant reason to believe that they are not originally much disproportionate to their end; and that if due care were taken, they would not arise in youth much before the proper time for this end. But the violence and unseasonableness of these passions are so manifest in the generality of young persons, that one cannot but conclude the general education of youth to be grossly erroneous and perverted; and, upon examination, this will appear very evident in fact. The diet of children and young persons is not sufficiently plain and sparing; a proper regulation of which would lay a better foundation for health and freedom from diseases, and put some check upon these passions. They are brought up in effeminacy, and neglect of bodily exertion, which would materially assist to prepare both body and mind for the discipline of life, and would restrain the sexual passion. The due culture of the mind, especially in respect of religion, is very generally neglected; so that the young are usually left without employment for their thoughts, and destitute of the chief armour, that of religious motives, whereby to oppose temptation. Lastly: the conversation which they hear, and the books which they are allowed to read, (and even to employ as a part of their learning,) are so corrupt in this respect, that it is a matter of astonishment how a parent, who has any serious concern for his child, can avoid seeing the immediate destructive consequences, or think that any consideration relating to this world can be a balance to them.

4. *Estimate of the Pleasures of Imagination.*—It does not appear from actual experience, that those who devote themselves to the study of the polite arts, or of science, or to any other pleasure of mere imagination, as their chief end and aim, do attain any greater degree of happiness than the rest of the world. The frequent repetition of these pleasures cloy, as in other cases; and though the whole circle is extensive, yet no one can grasp the whole, and as a matter of fact few apply themselves to more than one or two considerable branches. From the manner in which the feelings of imagination are usually generated, and transferred upon their several objects, it might be expected, that deformity would be often mixed with beauty, so as to produce an unpleasing discordancy of opinion, even in the same individual; and, as a matter of fact, it is not uncommon for men, after a long and immoderate pursuit of one class of beauty, natural or artificial, to deviate into such by-paths and singularities, that the objects excite rather pain than pleasure; their limits for excellence being narrow, and their rules absurd, and all that falls short of these being condemned by them as deformed and monstrous. Eminent votaries of this kind are generally remarkable for ignorance and imprudence in the common affairs of life; thus subjecting themselves to ridicule and contempt, and to real, great, and lasting inconveniences. Vanity, moroseness, and envy, are too generally the painful and injurious concomitants of an over-weening attention to the pursuit of these pleasures. And scepticism in religious matters is a frequent attendant here, which, if it could be supposed free from danger as to futurity, is at least very uncomfortable as to the present. This almost necessary consequence of such confined attention is, that too high a degree of importance is given to the object, and the superiority which is supposed to be possessed in it, is supposed also to extend to other cases in which the individual is perhaps uncommonly ignorant; and thus he either becomes dogmatical or sceptical; qualities which,

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though apparently different from each other, are, in reality, to be considered as antecedent and consequent, dogmatism being frequently followed by scepticism. And as religious knowledge, to be properly cultivated, requires that the soil should be prepared by the benevolent and pious affections, and no kind of learning being of itself sufficient to give this preparation, if attention to the pursuit of literature or of science be so inordinate as to suppress the growth of these affections, religion itself will be treated as incomprehensible, absurd, uncertain, or incredible.

It is, however, difficult to represent justly, what is the genuine consequence of the pursuit of the mere pleasures of the imagination; their votaries being also generally actuated by motives of ambition; but, as will be seen hereafter, this does not invalidate any of the foregoing remarks.

It is justly observed by Dr. Percival, that the endless progression of knowledge, is apt to give the love of it an inordinate ascendancy over every other principle; and as this passion does not, like the love of virtue, temper its particular exertions, by preserving a due subordination of the powers which it calls into action, the wildest extravagancies of emotion and of conduct, have been displayed by those who have submitted to its uncontrolled dominion.

Further, we have reason to suppose that the pleasures of imagination ought not to be made our chief end and aim, because in general they are the first of the intellectual pleasures, come to their height early in life, and decline in old age. There are some few, indeed, who continue devoted to them through life; so there are some to the pleasures of sensation; but both are irregularities which cannot be considered as indications of the designs of Providence respecting these pleasures. Hence the analogous argument respecting sensation, § 1, is applicable to these pleasures also. Like every other part of the great machine, they have their use, but it is a subordinate one; they tend to the improvement and perfection of our nature, but eminence in them is not that perfection. They teach a love of regularity, exactness, truth, simplicity: they lead to a knowledge of many important truths respecting themselves, the world in general, and its Author: they habituate to invent and to reason; and when the social, moral, and religious affections begin to be generated in us, we may make a much quicker progress towards the perfection of our natures by having a due stock, and no more than a due stock, of knowledge in natural and artificial things, of a relish for natural and artificial beauty.

5. *Regulation of the Pleasures of Imagination.*—As the pleasures of imagination are manifestly intended to assist in generating and augmenting the higher orders of benevolence, piety, and the moral sense, to these last may be made to perfect and improve the former.

(1) Those parts of the *arts and sciences* which inspire us with devout affections, and enable us to be most useful to others, abound with the most and greatest beauties. Thus the study of the scriptures, of natural history, and natural philosophy, of the frame of the human mind, &c. when undertaken with pious and benevolent intentions, lead to more interesting and surprising truths, than any study intended for mere private amusement.

Further, since the world is a system of benevolence, and consequently the Author of it is the object of unbounded love and adoration, benevolence and piety are the only true guides in our inquiries into it, the only clues which will lead through the labyrinth of nature. In the pursuit of every branch of valuable knowledge, let the inquirer take for granted that every thing is right on the whole, that is, let him with a pious confidence seek for benevolent pur-

poses, and he will find the right road, and by a due continuance in it, attain to some new and valuable truth; whereas, every other principle and motive for examination, being foreign to the great plan upon which the universe is constructed, must lead to endless mazes, errors, and perplexities. Again, it is to their tendency to the increase of happiness, that almost all truths owe their lustre. Hence those whose minds are under the influence of benevolence, will have the highest gratification which the perception of those truths can produce.

Lastly, the pleasures of the imagination point to devotion in a particular manner, from their unlimited nature. All the pleasures derived from beauty, both natural and artificial, begin to fade and languish after a short acquaintance with it: novelty is a never-failing requisite; we look down with indifference upon what we comprehend easily, and feel the wish to aim at such things as are but just within the compass of our present faculties. To what inference does this tendency to press forwards, this endless grasping after infinity, necessarily lead us? Is it not that the infinite Author of all things has so formed our faculties, that nothing less than himself can be an adequate object for them: that nothing finite, however great and glorious, can afford full and lasting satisfaction: that as nothing can give us more than a transitory delight, if its relation with God is excluded, so every thing, when considered as the production of his infinite wisdom and goodness, will gratify our utmost expectations, since, in this view, we may rest satisfied that every thing has numerous uses and excellencies, and that in the course of nature the least and vilest, according to common apprehension, bear a proper part, as well as those whose present superiority over them appears indefinitely great.

In fine, then, and then only, is science a worthy object of pursuit as a leading object, when it is pursued with just views; when it is valued for its tendency to form valuable mental habits, and to cultivate moral ones; when we appreciate its value by its enlarging our capacity of usefulness to our fellow men, and by its enabling us to raise our minds from sense to intellect, when we make it the path to religious and moral worth. As a means, it is highly conducive to the purification and perfection of our nature: pursued as an end, it will engross the affections, and more honourable and more fascinating than the sordid or sensible pleasures, it will by degrees become a more dangerous and obstinate evil than those.

The foregoing remarks more particularly respect the pleasures arising from the pursuit of the objects of the understanding; and we think it will be desirable to offer some observations on those arising from the elegancies and amusements of life, from wit, mirth, and humour, and from the polite arts. A great part of these we shall collect from Hartley's 57th and following propositions on those subjects.

(2) By the *elegancies of life* are to be understood, the artificial beauties of houses, gardens, furniture, dress, &c. There is in them, as in most other things, a certain middle point, which coincides with our duty and our happiness; while all great deviations from it incur the censure of criminality, or at least of unsuitableness and absurdity. It is impossible for any one exactly to judge for another on these points; but a few general principles may be of use respecting them.

Against the immoderate pursuits of the elegancies of life it may be urged; 1. That vanity and ostentation, and the *unlawful* pleasures of property, are almost inseparable from the pursuit of those elegancies, and often engross all to themselves. 2. The profusion of expence attending them is inconsistent with charity to those who are in want of our superfluities. 3. The beauties of nature are far superior to

all artificial ones: they are open to every one, and therefore rather restrain than feed the desire of property; and they lead to humility, devotion, and the study of the ways of Providence. We ought, therefore, much rather to apply ourselves to the contemplation of natural than of artificial beauty; and even the sources of the former should not be made our ultimate object.

On the other hand, that some attention may lawfully, and even ought to be paid to artificial beauty, will appear from the following considerations. 1. Convenience and utility are certainly lawful ends; nay, we are even sent hither to promote these publicly and privately. But these coincide for the most part with, and are promoted by, simplicity, neatness, regularity, and justness of proportion; that is, with some of the sources of artificial beauty; though not with all; such as grandeur, sumptuousness, and the profuse variety and accumulation of natural beauty and splendour. 2. The study of artificial beauty draws us off from the gross sensual pleasures; refines and spiritualizes our desires; and, when duly limited, teaches us to transfer and apply our ideas of simplicity, uniformity, and justness of proportion, to the heart and affections. 3. In this state of trial it is necessary to be occupied in innocent pursuits, lest we fall into such as are mischievous and sinful. It is therefore, in its proper place and degree, as great a charity to mankind to employ the poor in improving and ornamenting external objects, rewarding them generously and prudently for their labour, as to give alms; and as useful for the rich, at proper times, to be employed in contriving and conducting such designs, as to read, meditate, or pray at others. Our natures are too feeble to be always strained to the pitch of an active devotion or charity: so that we must be content, at some intervals, to take up with employments that are merely innocent, fitting loose to them, and pursuing them without eagerness or excessive devotion of mind.

These and similar reasons, for and against the pursuit of the elegancies of life, hold, in various degrees, according to the several circumstances of particular persons. And it will not be difficult for those who are really in earnest, endeavouring to do their duty, to balance them against one another in every case, so as to approach nearly to that medium wherein our duty and happiness coincide.

(3) "The practice of playing at games of chance or skill, is one of the principal amusements of life; and it may be thought hard to condemn it as absolutely unlawful, since there are particular cases of persons infirm in body or mind, where it seems requisite to draw them out of themselves, by a variety of ideas and ends in view, which gently engage the attention. But this reason takes place in very few instances. The general motives to play are, avarice, joined with a fraudulent intention, explicit or implicit, ostentation of skill, and spleen, through the want of some serious useful occupation. And as this practice arises from such corrupt sources, so it has a tendency to increase them; and, indeed, may be considered as an express method of begetting and inculcating self-interest, ill-will, envy, &c. For, by gaming a man learns to pursue his own interest solely and explicitly, and to rejoice at the loss of others as his gain; grieve at their gain as his own loss; thus entirely reversing the order established by Providence for social creatures, in which the advantage of one meets in the same point as the advantage of another; and their disadvantages likewise. Let the loss of time, fortune, reputation, serenity of temper, &c. be considered also."

We have quoted the above passage in Hartley's own words; because we do not quite accord with him in every respect, and yet think his statement deserving of serious at-

ention. Our principal objection to it is, that it does not take in a sufficient number of cases. His remarks are truly forcible against playing for money; and it can seldom be allowable, and never more. But we may consider them independently of this connection. The only case in which games of mere chance can be justifiable, Hartley has well laid down. The habit of gaming is so infatuating, and so destructive in its consequences to moral worth and happiness, that the mind should be kept from all tendencies to it, and impressed with a great horror of it, by all proper means. And the same reason excludes all games in which chance is the chief source of interest. Games of mere *skill* (such as chess) may be of considerable service, especially in the early part of life, in exercising attention, sagacity, activity, and forethought; and we should be disposed to encourage such among the young, particularly the volatile and thoughtless. As the plans of one must often depend upon the unforeseen determinations of another, involving many points of consideration, they call into play the qualities which are necessary in the business of life. To employ skilfully the unforeseen conjunctures of events, is often one of the greatest exercises of human wisdom. For this reason we do not think that games of skill, in which what we call chance has some share, are without their use; for those unforeseen conjunctures are, as far as respects ourselves, of the same character as those which occur in the mixed games we are speaking of; but we would not encourage them among the young, especially from their tendency to lead on to direct gaming, and to habits of wild speculation, by producing the practical belief that the valuable objects of human attention are to be obtained by some easier means than the straight-forward path of uprightness and patient persevering exertion. For reasons which correspond with those already stated, all betting and lottery speculations should be carefully avoided and discouraged; and these last in particular, because the injury done to the morals of society by the lotteries is great, almost beyond calculation, and it cannot therefore be right to encourage them.

With respect to these and recreations in general, if they clearly contribute to the bodily, intellectual, or moral health, then, so far, they are wise and useful; if the use of them tend to cultivate selfish purposes, (such as those of avarice, ill-will, vanity, envy, eagerness for superiority, &c.), or excite desires which cannot be gratified consistently with virtue, then they are wrong, either in themselves, in their degree, or in the mode of their employment: and it is the part of wisdom and duty to observe their effects, and the degree in which these are necessary, and to regulate, restrain, or altogether exclude them, accordingly.

We wish it to be considered, however, by those serious persons, who, penetrating deeply into the possible, but remote consequences of actions, leave the immediate effects and the actual state of human nature too much out of view, whether the interests of religion and virtue would not be more promoted among the young and inexperienced, by their giving their sanction to pleasures in themselves considered innocent, while innocently pursued, (that is with moderation, and without abuse to wrong purposes,) than by their marking the gaiety of youth and healthful activity with too severe an eye: and whether, by keeping altogether aloof from the common amusements of life, they do not remove an important restraint on the abuse of them. In the present circumstances of mankind, such amusements are necessary to keep men from actual vice: and the great object is to restrain them within due bounds, and to lessen their unavoidable evils as much as possible. If the good left them entirely, the bad would soon make them twofold more injurious than they

they are at present. Extreme rigour, we would farther suggest to them, with respect to amusements which are wrong only when carried to excess, tends to confound moral distinctions in the minds of the young, to weaken their own influence in their minds, and to render the strict discharge of duty unamiable and unpleasant.

(4) With respect to *mirth*, *wit*, and *humour*. 1. It is necessary to avoid all such as lessen our reverence to God and religious subjects, injure our dispositions, or excite in ourselves improper and corrupt inclinations. From Hartley's analysis of this species of the pleasures of the imagination, (*Obs.* vol. i. p. 439.) it can scarcely fail to appear to the reflecting mind, that the greatest part of what passes under these names, and that, too, which is in general estimation most striking, have a wrong tendency; and it is therefore necessary to be moderate and cautious in our mirth, and in our attention to wit and humour, and our endeavours after them. 2. However innocent mirth may be, and even if kept within narrow limits, it has a great tendency to produce a degree of levity and dissipation of mind, little consistent with the views of Christian duty respecting this life and its connection with another. 3. Wit and humour, by arising from the most part from fictitious contrasts and coincidences, have a direct tendency to disqualify the mind from the pursuit after truth, and attention to the useful practical relations of things. 4. Wit and humour too commonly generate an excessive love of admiration and applause; and the display of them, as it arises from it, so it contributes powerfully to increase it. See hereafter, § 6, 7.

A due attention being paid to these and similar cautions, it appears not only allowable, but even requisite to aim at a state of perpetual cheerfulness, and to permit ourselves to be amused and diverted by the innocent pleasantries of our friends and acquaintance, contributing also ourselves thereto, as far as is easy and natural to us. This temper of mind flows from benevolence and sociality, and in its turn produces them: it relieves the mind, qualifies us for the discharge of serious and afflicting duties, when the order of Providence lays them upon us: and it helps to correct, in ourselves and in others, many little follies and absurdities, which though they scarcely deserve a severe chastisement, yet ought not to be overlooked entirely.

(5) Respecting the *polite arts*, particularly those of *music*, *painting*, and *poetry*, the reader of the Observations can scarcely fail to infer, either that Hartley carried his views too far, or that there is considerable improvement among us with respect to public taste since his time; that it is, on the whole, decidedly more accordant with virtue. We think the latter. Except among the gay and licentious, who lay themselves under no restraints of duty, we see no reason to believe that there is a greater regard than in the former part of the last century, to decency of manner: and if something is lost in the way of creative genius, in consequence of the restraint which this improvement lays upon the imagination, there is no doubt that a great deal of much more consequence is gained. To a certain extent, however, Hartley's rules appear still to be too well founded, and we shall accommodate the spirit of them to what appears to us the present state of things among those who have some principle of duty, and add some other remarks. In the way of caution respecting them, we observe, 1. It is evident that, to leave out of view the avowedly licentious kinds of music, painting, and poetry, there are many which have a close connection with vice; particularly with the vices of intemperance and lewdness, representing them in gay and pleasing colours, or at least taking off from the abhorrence due to them. 2. Great skill in these arts requires an extensive consumption of time

upon them; they are very apt to excite vanity and self-conceit in their votaries; and in many cases, the expences with which they are attended are too great to be reconciled with charity to the poor, and other duties of a man's station and relations in life. 3. The pleasures arising from these sources are of that fascinating nature, and tend to excite the feelings so much in various ways, that, when the pursuit of them is carried to excess, it unfits the mind for the active and serious employments and duties of life; making them appear insipid, and at the same time, by the constant effects of over-excitement, weakening the mind itself for attention to them. This is a great and serious evil, and it particularly respects the arts of poetry and music, including under the former all the classes of works in the production of which the imagination has the chief share. We say less respecting the pleasures derivable from the art of painting, because they are either of comparatively rare occurrence, or, if otherwise, as in the case of the artist, are attended with an exercise of the habits of patience, attention, and ingenuity, yet without, in a general way, any excessive excitement of mind. In this connection we solicit the reader's attention to the remarks which we have offered in *MORAL Education*, III. 11, 12. col. 51, 52.

Nevertheless it is to be observed, on the other hand, 1. That the polite arts in general, when pursued with innocence and moderation, have, in a great measure, the effects pointed out at the end of § 4, and do strongly contribute to raise the mind one step at least above the pleasures of mere sensation. 2. They also contribute in no inconsiderable degree, but, as is obvious, in different proportions, to the pleasures of sociality; and similar remarks to those which were made respecting wit and humour, may be applied with respect to the arts, where the application of them is consistent with virtue. 3. The art of painting, and others related to it, are of eminent use in the promotion of science, and in the application of it to various practical purposes of life: and they cultivate the habits of observation, and the taste for natural beauty. 4. Works of imagination, when under the guidance of good sense and observation, and of sound principles of morality, have often a beneficial effect, in refining the mind, raising it above the more sordid pursuits of selfishness, inspiring it with generous and noble sentiments, and communicating to it a knowledge of human nature, which may not unfrequently assist in supplying the want of experience, or at least in extending what we possess. (On this point, see *INTELLECTUAL Education*, XII.) 5. Of the art of music there is probably room to be the most suspicious, through its peculiarly powerful effects on the physical and mental sensibilities. It can be directly licentious, only through its associated circumstances; but from these and its physical effects, it has great influence in preparing for the admission of loose desires and conceptions. Musical skill among young men too commonly leads to social intercourse of a pernicious kind; and among females to vanity and ostentation. Nevertheless it must be allowed by all, that its pleasures do essentially contribute to the innocent pleasures of sociality; and where it is employed to enliven the domestic circle, or to afford recreation to the fatigued and harassed mind, and these always restrained within the bounds of moderation, it is not only agreeable but useful. But, 6. All these arts are capable of being directly devoted to the interests of religion and virtue: and when so devoted, they not only improve and exalt the mind, but are themselves improved and exalted to a much higher degree than when employed upon subjects unconnected with, or in opposition to them. The dignity and importance of the ideas derived from religion, add a peculiar force and lustre to them.

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Here this cultivation may be made an excellent means of awaking and alarming our affections, and transferring them upon their true objects.

With respect to all the pleasures appropriate to the imagination, (considered as distinct from those of the understanding, which Hartley might, perhaps, with great advantage, have made a separate class,) the true principles are, that they should always be pursued in complete subserviency to the great ends of life, without interfering with the duties of piety and benevolence, or with the proper employments of our station; that where they are derived from the mere recreations of life, they should be carefully kept within the limits of innocence and moderation; employed lawfully, and for lawful ends; so as not only to be free from injury at the time, but from injurious effects afterwards; and that all the pleasures of the imagination should, as much as possible, be associated with the pursuits of benevolence and religious duty, so that they may contribute to increase the tendencies of the mind to those pursuits.

Upon most of the subjects of this section, and upon others connected with them, if the writer's recollection is accurate, the reader will find many important observations in the first volume of Clarkson's Portraiture of Quakerism.

6. *Estimate of the Pleasures of Ambition.*—That the pleasures of honour ought not to be made a primary object of pursuit, appears from the following considerations. An eager desire of the pleasures of honour, and an earnest endeavour to obtain them, has a manifest tendency to disappoint itself. The merit of actions, that is, that property for which they are approved and admired, and the agent loved or esteemed, is, that they proceed from benevolence, or some other moral or religious consideration; whereas, if the desire of praise form any considerable part of the motive, we censure rather than commend. But if praise be supposed the greatest good, the desire of it will prevail over other desires; and vanity, self-conceit, and pride, qualities which all regard as censurable, will be necessary consequents. Again, if praise be considered as the supreme good of the species, what is there which shall be selected as the greatest subject of encomium. What is there which shall be the universal object of praise, as well as within the reach of every one. External advantages, riches, beauty, strength, &c.? These are neither in the power of all, nor universally commended. Great talents, wit, sagacity, invention? These, though more the subjects of encomium, fall to the lot of very few only. In short, virtue alone is both universally esteemed, and in the power of all who are sufficiently desirous to attain it. But virtue cannot consist with the direct pursuit of praise; much less with its being made a primary object. Hence it ought not to be made such. Even those who possess the advantages which are made the subject of praise, can seldom pursue praise with success. Praise cannot be the lot of many, because it supposes something extraordinary in the thing praised; so that he who pursues it must either have a very good opinion of himself, which is a dangerous quality in the seeker of praise, or allow that there are many chances against him. The same conclusion is drawn, if we consider the *progress* of the pleasures of honour. Children are pleased with encomiums upon any advantageous circumstances which relate to them; but this wears off by degrees; and as we advance in life we learn more and more to confine our pleasures of this kind, to things within our own power, and to virtue. In like manner, the judicious part of mankind, that is, those whose praise is most valued, give it only to virtue, and to those feelings and habits of which virtue is the basis. Here, again, is a manifest subserviency of these pleasures to

virtue; they not only tell us that they cannot be our ultimate end, but shew us what is.

If we suppose a person to be perpetually feasting his mind with the praises that already are, or which he hopes will be hereafter, given to him, we at once perceive something extremely absurd and ridiculous in his conduct. And yet, unless a man do this, which besides would incapacitate him for deserving or obtaining praise, how can he fill up a thousandth part of his time with the pleasures of ambition. Further, men who are much commended, are apt to think themselves above the level of the rest of the world; and it is evident, that praise from inferiors wants much of the high relish those expect who make praise an object; it is even uneasy and painful to a man to hear himself commended, though he may think it his due, by a person whom he does not think qualified to judge. And in this view of things, a mind which has acquired truly philosophical and religious notions sees immediately, that all the praises of mankind are comparatively of no value, because no man can be a thoroughly competent judge of the actions and motives of others. Lastly, the desire of praise carries us from less to greater circles of applauders, at greater distances of time and place; hence it necessarily inspires us with an eager hope of a future life. Now all reflections upon a future life, the new scenes which will be unfolded there, the discoveries which will then be made of the secrets of all hearts, must cast a damp upon every ambition, except a virtuous one, and produce diffidence even in those who have the best testimony of their conscience.

7. *Regulation of the Pleasures of Honour.*—We have already seen sufficient ground for the position, that it is a law of our natures, that the inferior sources of happiness are most productive of happiness, when not made the primary objects of pursuit, but submitted to the direction of the higher means. This is eminently the case with respect to the pleasures of honour. They may undoubtedly be obtained in their highest degree, and in their greatest perfection, by paying a strict regard to the precepts of benevolence, piety, and the moral sense. These precepts lead to the attainment of those qualities, and the performance of those actions, whose value is universally felt, and universally admitted; and, at the same time, they preserve from that ostentatious display of them, or of other supposed grounds of honour which would make their possessor ridiculous or contemptible. Honour is certainly affixed, by the bulk of mankind, to actions of *benevolence*, such as acts of generosity, compassion, public spirit, &c.; and the encomiums bestowed upon such actions are one principal source of the feelings of the moral sense. The maximum of honour, therefore, must coincide with benevolence, and the moral sense, and, consequently, with piety also, which is closely connected with them. It must, however, be admitted, that direct acts of *piety* are by no means calculated to gain the honour of the world in general; but, on the contrary, they expose to the reproach of enthusiasm, superstition, &c.; on the other hand, however, it must also be admitted, that humility, which is the principal of all the qualifications which recommend men to the world, cannot be obtained in any high degree without piety. Hence piety indirectly leads to the honour of men; and at the same time in proportion as piety increases in its efficacy on the mind, the fear of their censure gradually diminishes.

The grand source of honour, directly or indirectly, is the tendency of an action or disposition to happiness of some kind or other, occurring to a man's self, or to the world by his means. He, therefore, who is most happy in himself,

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and contributes most to the happiness of others, must, in the end, from the very law of our natures, have the greatest quantity of honourable associations conferred upon him. But it has already appeared, in part, that benevolence, piety, and the moral sense, are the only true and lasting sources of *private* happiness; and that the greatest *public* happiness arises from them cannot be doubted by any one: hence he in whom these qualities are prevalent, will, as far as his character is known and understood, obtain the applause of all, both good and bad. The esteem of the good he will first obtain; because they can most easily estimate his worth; and it is this alone which is valuable and useful, in exciting to honourable attainments.

In proportion as the views extend, and the comprehension of the mind increases, the desire of honour and esteem will require higher sources of gratification than that of men, even of the wise and good; it rises even to the throne of the Most High, and from him to whom all hearts are open, humbly hopes for approbation. This greatest of all honours can, undeniably, be obtained only by a regard to piety, benevolence, and the moral sense. If the desire of it be not the desire of our mind, it must arise from such inattention to the most important relations in which we stand, as is totally inconsistent with our true happiness; and if it become a ruling principle of our minds, all encomiums will derive their value from their consistency with this the highest standard of honour.

8. *On Pride and Vanity.*—Before we offer a few considerations on this point, it may be requisite that we explain in what manner we use our terms, since they are employed (particularly *pride*) with a latitude which serves to throw great discredit on the representations of the moralist on the subject; and by the transference of the associations connected with what is called *honest* or *laudable*, or even *virtuous* pride, to a quality of the mind which in every shape of it is vicious, that abhorrence of real pride is diminished, which its obvious ill consequences should always produce.

By *pride* we understand, an *unjust feeling of superiority over others*, or (without direct comparison with others) of *elevation in the scale* by which the individual estimates honour: by *vanity* we mean, an *excessive desire of the praise or good opinion of others*. The former indicates an *unfounded opinion* as to the *title to honour*; the latter is generally accompanied with some opinion of that kind, but it does not necessarily imply more than an *eager desire* of honour. This paragraph the reader will find, with a little variation, in *MORAL EDUCATION*, II. remark 5, where there are some observations respecting the *comparative* effects of pride and vanity, and the employment of the stimulus of praise, which would have been introduced in this section, if they had not been inserted then; and we beg leave to refer the reader to them.

Pride may exist almost singly in the mind; altogether, or at least, almost independent of vanity. There may be those to whom their own good opinion (independently of the approbation of God) is every thing; and who find the sympathy of others totally unnecessary for the nurture of their own pride. In the present state of society this is not common; the good opinion of others is productive of too many important consequences, ever to permit pride to be thus fostered; except where it is the effort of a strong, but ill-directed mind, to counterbalance the disappointments of vanity. He who has made the good opinion of others the primary object of pursuit, having met with its sure consequence,—disappointment in his wishes,—if he have not lost all his strength of mind by the weakening effects of vanity, will

endeavour to rise above it; and if he have no religious principles, or but little religious culture, will dwell with gratification upon all the fancied excellencies of his own character, till they have acquired in his estimation an importance to which they are little, if at all, entitled. Then moroseness must be the predominant feature in his temper; for he cannot bear that others should treat him with less respect than he thinks he has a right to claim: till at last an almost total unconcern for the opinion of others is forced upon his mind, and having no higher principle of action he becomes a misanthrope. It is probably doing no injustice to the character of Swift, when we mention him as having in a great measure gone this round. But this is an extreme case: pride leads a man to set too high a value upon himself, but it is only that strength of mind which, when well directed, would have led to the highest attainments in moral worth, that will permit him to rest satisfied without the sympathy which he supposes is his due. Hence his pride must meet with a constant mortification; for where will be found those who will be willing to restrain their conduct continually by the rules to which he would bind them? where even are those who can enter into his views and feelings? Pride then, even in a less extreme case, cannot be productive of happiness. But its ill effects are not thus limited. Blind to his own deficiencies, keen-sighted to observe the marks of merit in his own mind, the proud man throws continual impediments in his own progress towards worth of character. He sees not his deficiencies; how can he supply them? He imagines his excellencies have mounted high in the scale of worth; how shall he purify them, when that which presents their eminence is fostered by every comparison which he draws?

It has been said by one who appears to have possessed some knowledge of the world, that pride has at least this valuable effect,—it tends to exclude all other failings; for the proud man places his standard so high, that he never feels his regard to his own dignity satisfied, till all inferior feelings are extirpated: this is undoubtedly erroneous. It is supposing a mixture of pride and humility, which will never appear in that mind in which pride is the ruling feature. The man who is proud of his own excellencies seldom sees that they are defective: and besides, a desire of self-approbation is not pride, though too strong and unchastened a desire may tend to produce pride, because self-approbation is easily gained when made independent of higher sources. There may be anomalies here, as in every other case of the operation of moral causes; but they are not sufficient to lead to the conclusion, that pride has a tendency to raise the mind above all other failings. Pride will operate differently on different minds; and the desire of self-approbation is, and ought to be, a primary motive in all the earlier stages of the moral progress: but if the mind rest satisfied with this approbation, that progress will soon be impeded; the standard will be lowered rather than the conduct exalted; comparison with others will suggest numerous sources of self-gratulation; and the mind, unable to rise to the heights which once appeared in view, now rather looks down upon the advances she has made, than upon the cliffs which tower very far above her. Here, then, is a stop to improvement; the desire which stimulated to improvement is gratified: and he, who, had he looked beyond himself, might have risen almost to the summit of excellence, now rests contented on the little pinnacle which his imagination has raised, looks with contempt on the crowds below, but, wrapt in the veil of imaginary superiority, sees not that numbers whom he once saw below  
him

him have risen, and are rising, while he is himself lost to all improvement.

In minds possessed of some strength, pride may exist with little or no tendency to vanity. Firmly convinced of their own worth, they need not the sympathy of others; and if that respect which they deem their due is not given, it is the last suggestion that would occur to their minds that they had mistaken their due. But in those whose pride is less confirmed, or whose minds are more dependent, that pride leads them on to vanity; their high ideas of their own powers and attainments, require the sympathy of others to render them steady. Precisely as pride or vanity has the predominance, the want of such gratification will lead to greater independence, or greater submission; in the one case leaving the mind to the wayward wanderings of its own feelings, in the other fixing more firmly the shackles which bind it to the world. Happy they who have learnt from various discipline and instruction, that higher approbation is to be sought for, than the approbation of the world, or even than their own; and that neither possess permanent value, except where sanctioned by that which, when once the ruling object of the mind, will make all others comparatively insignificant!

We stated that pride may exist in the mind almost independently of vanity: from what we have advanced it appears, that this can be the case only in a vigorous mind: vanity, we would add, will be found independently of pride only in a weak mind. He who cannot rest satisfied without the praise or approbation of others, must be ever varying in his ideas, and fickle in his conduct. Without it, he will possess no firmness; and with it, no decision. The approbation which pride claims as its due, vanity seeks as a favour: if it receive it not, the vain mind desponds, for it has not learned to trust in itself.

[Here we would request the reader to turn to the observations referred to near the beginning of this section. See *Moral Education*, col. 38.]

The virtue of humility is the most difficult to acquire of all the train, yet it is this which gives the true grace to the character. It is the characteristic of Christianity, and it is in this respect that the Christian so far excels the stoical system of morality in its best state. The whole structure of the latter was laid upon the foundation of human pride; and though frequently captivating to the imagination, which loves to view the elevated mind, yet it often affords a poor shelter to the children of humanity. Humility does not direct us to estimate ourselves lower than impartiality requires; but it is seldom that we need fear wandering into this extreme, except where it arises from that self-diffidence, which distrusts merely because vanity has not yet lent its support. This excess of diffidence is not unfrequently the cause of vanity: for the mind, in consequence of it, often feels the more eager desire to be well in the estimation of others; and, when their good opinion is obtained, fosters the thoughts and pleasures of it with too great interest. Still however the frequent mortifications it meets with tend to lower it in its own estimation, unless, by degrees, it learns to set a value upon its own approbation, independently of the capricious applause of others; and then it deviates into the opposite extreme of self-sufficiency and pride. Here a strong mind, not under religious culture, will rest; a weak one will probably be again driven to that support on which it originally rested its self-approbation. If it do not return to its former state, the attentions which vanity received as a favour, pride claims as its right: and in both cases endless inquietude, envy, and resentment, are the almost necessary attendants. On the

subject of this section, see Cogan's *Philosophical Treatise on the Passions*, p. 70, &c.

9. *Cultivation of Humility*.—In order to cultivate the tender plant of genuine humility, we must clear away the high ideas we have of our own excellencies. All thoughts which please are apt to recur frequently; and their contraries to be kept out of sight: hence, by dwelling upon these excellencies, they will be magnified; by keeping our imperfections out of view, they are diminished. And the same causes too frequently lead to keep in view the defects of others, and neglect the consideration of their excellencies; and thus pride, that is, too high an opinion of ourselves, and, as a general consequence, too low an opinion of others, must be generated. Now the only way to obtain a just opinion of ourselves is to reverse this operation, and, by express acts of volition, dwell upon the excellencies of others and our own defects, and to pass by, with little notice, the defects of others and our own excellencies.

To cultivate humility we must farther learn not to seek the applause of the world, but to acquiesce in the respect it pays us, however disproportioned this may be to the merit of the action under consideration. We should remember, that however beautiful the productions of nature and art which pass under our notice, it would be absurd to say, till long experience and accurate examination justified it, that they are unequalled in their kind: much less should we suppose this of those sources of honour which happen to be our lot, which are certainly magnified beyond the truth in our own eyes from the interest we take in ourselves. On the other hand, humility will be cultivated by receiving with readiness the censures and shame which we have deserved; and by acquiescing under them where we have not deserved them; in this last case always suspecting our own judgment.

Lastly: the frequent recollection that all our valuable qualities proceed from God, that we have nothing which we did not receive from him, and that there could be no reason in ourselves why he should select us to perform the particular part he hath assigned us; and the application of this important truth to the real occurrences of our lives, must greatly accelerate our progress to humility and self-annihilation.

10. *Estimate of the Pleasures of Self-interest*.—We ought not primarily to pursue the means of obtaining the pleasures of sensation, imagination, or ambition; because these pleasures themselves, from what we have already seen, ought not to be made a primary object of pursuit. The means borrow all their value from their end by association; and if the original value of the end be not sufficient to justify our making them our primary object, the borrowed value of the means cannot.

*Gross self-interest*, or the treasuring up of the means of happiness from these sources of sensation, imagination, and ambition, bears a very near relation to ambition. Those who desire great degrees of riches, power, learning, &c. desire also that their acquisition should be known to the world: *to be thought* happy often constitutes a stronger motive for action, than *to be* happy. The reason, therefore, which excludes ambition as a primary pursuit, excludes self-interest also.—Gross self-interest has a manifest tendency to deprive us of the pleasures of sympathy, and to expose to its pains. Rapaciousness extinguishes all sparks of good will and generosity, and produces endless resentments and jealousies: and indeed great part of the contentions and mutual injuries, which we see in the world, arise because either one or both of the contending parties desire more than

than an equitable share of the means of happiness. Besides, gross self-interest has a most painful and peculiar tendency to increase itself, by the constant recurrence, and consequent augmentation, of the ideas and desires that relate to self, and the exclusion of those which relate to others. This inconsistency of gross self-interest with sympathy would be an argument against it, barely upon the supposition that sympathy was one necessary part of our nature, which ought to have an equal share with sensation, imagination, and ambition; but as it now begins to appear, from the exclusion of those as primary objects, that more than an equal share is due to sympathy, the opposition between them is a strong argument against self-interest. There is, in like manner, an evident opposition between gross self-interest and the pleasures of theopathy, and the moral sense. Hence, if these be admitted as essential parts of our nature, and especially if it appear that they ought to be made primary objects of pursuit, an insuperable objection arises against our making the pleasures of self-interest our primary objects. Gross self-interest, when indulged, destroys many of the pleasures of sensation, and most of those of imagination and ambition; that is, many of those pleasures from which it takes its rise. This is peculiarly true and evident in the love of money, and it holds in a considerable degree with respect to other selfish pursuits. It must, therefore, destroy itself in part, as well as the pleasures of sympathy, theopathy, and the moral sense, with the refined self-interest founded upon them: and thus it happens, that in very avaricious persons, nothing remains but a sensual selfishness, and an uneasy hankering after money, which is a more imperfect state than that in which they were at their first setting out in infancy.

Men, in treasuring up the means of happiness without limit, seem to go upon the supposition that their capacity for enjoying particular species of happiness is infinite, and consequently that the power of enjoyment depends upon the stock of means which they amass. But our capacity for enjoying happiness is confined and fluctuating; and there are many periods during which no object, however grateful to others, can afford any pleasure, owing to the diseased state of our minds or of our bodies.

Further: it is evident in part, that self-interested men are not more happy than others, whatever means of happiness they may possess. Experience appears to confirm the reasoning already adduced, but it certainly confirms this conclusion. Those who are continually aiming to treasure up the means of happiness, are in general remarkably miserable. The covetous man subjects himself to hardship, cares, fear, ridicule, and contempt; and thus undergoes greater evils than what falls to the share of mankind upon an average.

Some degree of *refined self-interest* is the necessary consequence of the power of receiving the pleasures of sympathy and theopathy. He who has had a sufficient experience of the pleasures of friendship, generosity, devotion, and self-approbation, cannot avoid the desire to have a return of them, when he is not under the particular influence of any one of them, merely on account of the pleasure which they have afforded; and if he have not advanced into very considerable purity of motives, will seek to excite those pleasures, by treasuring up the means of them; and to keep himself in a disposition to use them, not from any particularly vivid love of his neighbour, or of God, or from a sense of duty, but entirely from the view of private happiness. Refined self-interest is neither so common, nor so conspicuous in real life as the gross self-interest. It rises late, and is never in any great magnitude in the bulk of mankind, through the want of the previous pleasures of sympathy, religion, and the moral sense; and in some it

scarcely prevails at all: whereas gross self-interest rises early in infancy, and arrives at considerable magnitude before adult age.

The objections which lie against making the pursuit of refined self-interest our ultimate object, though less obvious, do not appear less weighty than those which lie against gross self-interest. In the first place, the mind which has so far advanced towards perfection, as to make the means of obtaining the refined pleasures of religion and virtue the primary object, will be more likely finally to stop at this point, than he who was guided by gross self-interest. There is less the appearance of deficiency, and less opposition between it and the claims of benevolence and piety; and as it leads to the performance of laudable actions, the conscience is too apt to give approbation, where, if all that influenced the mind were brought into full view, nothing but self would be seen. Hence there is little inducement to refine the motives, and purify them from their base alloy; and making self continually the motive, checks the natural progress of the affections to complete disinterestedness.

To act with a direct view to the pleasures of benevolence and piety, seems to carry with it a degree of selfishness little superior to that of the refined sensualist, who chooses from among the objects of his degraded taste such only as will give the least alloyed pleasures, and those of the most continued duration. It differs from his selfishness, in producing to society more valuable effects; but from what has been stated respecting the progress of the affections in the preceding article, and in *MORAL Education*, it appears that it is very considerably below that state in which the affection is perfect: and we have already seen that it stops its progress towards that perfection. It may fairly be admitted in the commencement of a virtuous course, as a step towards improvement; but if the mind be suffered to rest here, we cannot esteem its progress great. In addition to these objections, some very forcible ones will appear among those which lie against acting with an explicit view to our greatest happiness on the whole; making even the highest and least debasing, because least specific kind of self-interest, our ground of action.

*Rational self-interest* is certainly to be put upon a very different footing from the gross and refined: agreeably to which, the scriptures promise general hopes and fears, and especially those of a future state, and inculcate them as good and proper motives; and they may, therefore, certainly be considered as auxiliary in our moral progress. But Christianity holds out still more refined motives, distinct from hope and fear,—the love of God and our neighbour, the law of our minds, &c.; that is, the motives of sympathy, theopathy, and the moral sense. Rational self-interest will lead to the formation of these, and to the destruction of the impure motives to action; and precisely as far as it does this, it may be reckoned a virtue. When it tends to cherish the impure motives, or simply to obstruct the growth of the pure motives, then it must be considered as vice.

That we ought not to rest satisfied with that state in the moral progress, in which an explicit and direct view to the greatest general happiness or misery is made the primary motive to action, may be argued from the consideration, that a constant attention even to these most general hopes and fears would extinguish, by degrees, our love of God and our neighbour; and this especially by augmenting the ideas and desires which centre immediately in self to an undue height. While our own happiness, even the most refined and general, is the explicit motive, benevolence and piety will never acquire that disinterestedness, which will prompt to their respective course of conduct, without any

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exterior stimulus, simply by the impulse of the affection. Rational self-interest will at times be present to the mind, even of those who have advanced highest in the scale of present excellence; and in the early stages of the moral progress, may be called in as a most useful auxiliary, and important support: but even this must be made subordinate to the cultivation of those affections, which are only perfect as they approach disinterestedness.

On the subject of this head, we wish to refer our readers to Dr. Priestley's sermon on the duty of not living to ourselves.

We shall conclude this head in the words of Dr. Reid, with a few alterations. Though a steady pursuit of our own real good may, in an enlightened mind, produce a degree of virtue which is entitled to some approbation; yet it can never, while the mind rests with this explicit regard to self, produce the noblest kind of virtue which claims our highest love and esteem. We account him a wise man who is wise for himself; and if he prosecute his end through difficulties and temptations, his character is far superior to that of the man who, having the same end in view, is continually starting out of the road from an attachment to his appetites and passions, and doing every day what he knows he shall heartily repent of having done. Yet after all, this wise man, whose thoughts and cares are all centered ultimately in himself, who indulges even his social and divine affections, only with a view to his own good, is not the man whom we cordially esteem, nor who possesses the noble elevation of mind which commands our admiration. Our cordial esteem and admiration are due, and are given only to him whose soul is not contracted within itself, but embraces a more extensive object; who loves religion, not for her dowry only, but for her own sake; whose benevolence is not selfish, but generous and disinterested; who, forgetful of himself, has the common good at heart, not as a means only, but as an end; who abhors what God and conscience condemn, however attractive its appearance; who chooses without hesitation what God and conscience approve, though surrounded with tenfold dangers. Such a man we esteem the perfect man, compared with whom, he who has no other aim than good to himself, is a mean and despicable character. To serve God, and be useful to mankind, without any concern about our own good and happiness, is probably beyond the pitch of human nature. But to serve God, and be useful to men, merely to obtain good to ourselves, or to avoid ill, is imperfect service, and not of that liberal nature which true devotion and real virtue require.

Though we might be apt to think that he has the best chance for happiness, who has no other end of his deliberate actions but his own good, yet a little consideration will satisfy us of the contrary. A concern for our own good is not a principle that, of itself, gives any enjoyment; on the contrary, it is apt to fill the mind with fear, and care, and anxiety. And these concomitants of this principle often give pain and uneasiness, which counterbalance the good they have in view. We may compare in point of present happiness, two imaginary characters; the first, that of the man who has no other ultimate end of his deliberate actions than his own good, and who has no regard to religion and duty, but as a means to that end; the second, of the man who is not indifferent with regard to his own good, but has another ultimate end, perfectly consistent with it, a disinterested love of goodness for its own sake, or a regard to duty as an end. Comparing these two characters in point of happiness, that we may give all possible advantage to the selfish principle, we shall suppose the man who is actuated solely by it, to be so far enlightened as to see it his interest

to live soberly, righteously, and piously in the world, and that he follows the same course of conduct, from the motive of his own good only, which the other does, in a great measure, or in some measure, from a sense of duty. The one labours for hire, without any love to the work, the other loves the work, and thinks it the most noble and the most honourable he can be employed in. In the first it is mortification and self-denial to which he submits only through necessity; to the other it is victory and triumph in the most honourable warfare. It ought further to be considered, that though wise men have concluded that virtue is the only road to happiness, and the commands of a benevolent Creator necessarily lead us to consider it as such, yet he who follows it only as a means to an end, and who obeys God only for the sake of the rewards he has attached to obedience, would, in all probability, be continually wandering from the direct path, and seeking for happiness where it was not to be found. The road to duty is so plain, that the man who seeks it with an upright heart cannot greatly wander from it; but the road to happiness, except where that confidence in the Supreme Being is formed, which supposes the pious affections to have become, in some measure, disinterested, would be found dark and intricate, full of thorns and dangers, and therefore not to be trodden without fear and care, and perplexity. The happy man, therefore, is not he whose happiness is his primary care; but he who, with perfect resignation, leaves the care of his happiness to his Maker, while he pursues with ardour the road of his duty. This gives an elevation to his mind which is real happiness; instead of care, and fear, and anxiety, and disappointment, it brings peace and joy. It gives a relish to every good we enjoy; it smooths the brow of distress, calms the perturbed mind, and makes the pillow of suffering and of death the rest of happiness. See *Active Powers*, *ess. iii. p. iii. ch. 4.*

11. *Estimate of the Pleasures of Sympathy.*—We have now proceeded through, and examined all the inferior sources of happiness. We have seen that if any of them be made the primary object of pursuit, happiness cannot be obtained; and that the greatest degrees of these pleasures are to be obtained, not by making them our primary object, but submitting ourselves to the guidance of piety, benevolence, and the moral sense. We might hence alone regard the inference a just one, that the affections of benevolence and piety, and those actions to which they prompt, should be made by us our primary object. We shall feel our ground more sure, when we enter into the positive arguments for the conclusion; and we now proceed to ascertain what rank the benevolent affections should have, in our rule of life. And it will appear that the cultivation of these affections, and the conduct to which they prompt, should be made a primary object of pursuit, from the following considerations.

Benevolence improves the inferior pleasures, by limiting and regulating them, as we have already seen in the preceding sections.

Again, the pleasures of benevolence unite and coincide with those of piety and the moral sense. That benevolence unites with piety is obvious, for by the love of the good we are led to love the source of goodness; and back again from the love of God to the love of all that he has made. The pleasures of benevolence are one principal source of the moral sense, and the moral sense in its turn improves and enforces them entirely.

The pleasures of benevolence are unlimited in their extent. In order to shew that the pleasures of sensation do not deserve our primary attention, an extreme case was taken of a person who actually made them his primary object: in the same way suppose a person to take all opportunities of ex-

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exercising his benevolent dispositions, making it his study, pleasure, and constant employment either to promote happiness or to lessen misery. Now it is very obvious that he would have a very large field for exercise, no less than the whole round of domestic and social relations. And if his benevolence were pure, and regulated by the dictates of piety and the moral sense, he might in general expect success. And from the experience of those who have made the trial, it does not appear that the relish for its pleasures languishes, as in other cases, but gains strength by gratification; and they continue to please in reflection. The reason of this is obvious from the law of association; for since they are, in general, attended with success, and are consistent with, and productive of, the several inferior pleasures, when these are pursued in their due degree, and are also further increased by the moral and religious pleasures, they receive fresh addition upon every gratification, and therefore increase perpetually, not perhaps in vividness, but in extent as well as steadiness, when the affections are cultivated as they ought to be.

The pleasures of benevolence are *self-consistent*. All may share them without diminishing their mutual happiness. Harmony and mutual co-operation prevail among the benevolent; and benevolent actions have a tendency to excite correspondent actions indefinitely. By degrees, when benevolence has arrived at its due height, all the sensibilities of the individual for himself, will be more or less transferred upon others, by his benevolence and compassion for them. And in like manner, when our moral sense is sufficiently established and improved, and we are capable of being influenced to perform what is fit and right, by the consideration that it is so, our imperfect sensibility for others tends to diminish (by being compared with it) our exorbitant attachment to ourselves; at the same time that compassion takes off our thoughts from ourselves. And benevolence to a single person may become equal to self-interest by this tendency of self-interest to increase benevolence, and reciprocally of benevolence to lessen self-interest, though originally self-interest was indefinitely greater than benevolence; and thus we may learn to be as much concerned for others as for ourselves, and as little concerned for ourselves as for others. It is not often that benevolence is thus heightened: perhaps, in the strictest sense, it can never reach this height in the present state; but let us take the case where there is a decided preponderance of benevolence over every feeling which bears the character of malevolence. It is not, perhaps, capable of proof, but certainly has decided probability, that in the circle in which each moves, and in the circle of the race at large, happiness greatly preponderates. If the benevolent individual, though he do not see this balance of happiness clearly, yet has some comfortable general knowledge of it, he must be a great gainer in the whole by his benevolence, because thus he has a source of constant gratification in the perception of such a preponderance of happiness among those in whose happiness he has learned to rejoice in some measure as in his own.

It will confirm our belief that the cultivation of benevolence should be made a primary pursuit of life, if we recollect that *its pleasures lie open to all* kinds and degrees of men; since every man has it in his power to benefit others, and since we all stand in need of each other's good offices. Unlike the brute creation, we are dependent upon each other from the cradle to the grave, for life, for health, for convenience, for pleasures, for intellectual accomplishments, and, in no small degree, for moral culture; and we are unable to subsist with comfort singly, or even in very small societies, and this may be considered as a mark of the superior excellence of man's social pleasures. All the tendencies of

the events of life, ordinary and extraordinary, of the relations of life, of the various pleasures which have been enumerated, to connect us together, to connect accidental associations, and those forced upon us by the common situation of man, and his situation in society, into permanent affections, prove the same thing. So great, indeed, is this tendency, that two men without claims to the title of benevolent, can scarcely become familiarly known to each other, without receiving some good-will, complacency, compassion, and tenderness for each other. Further, we love, esteem, and assist the benevolent more than others: so that a benevolent action not only excites the receiver to a grateful return, but also the by-stander to approve and reward: and benevolence receives a hundred fold even in this world. "But," says the excellent Hartley, "it would be endless to pursue this. Benevolence is, indeed, the grand design and purport of human life, of this probationary state; and every circumstance of human life, duly considered, must and does point to it directly or indirectly."

And as it is now established that benevolence is a primary pursuit, it follows that *all the pleasures of malevolence are excluded*, as direct obstacles to our happiness. The lower pleasures may all be made consistent with, and even subservient to, benevolence; by its limitations and power; but those of malevolence are quite incompatible with it. As far as malevolence is allowed, benevolence must be destroyed. There is, however, this exception; where wishing evil to some, proposes us to be more benevolent on the whole, (as in the case of what is called a just indignation against the vicious,) it may somewhat aid the moral progress in the lower stages of benevolence. But it is exceedingly dangerous to encourage such a disposition of mind, by satire, invective, or dispute, however unworthy the opponent may be; for fostered, it will soon wear the features of ill-will, will soon become rank malevolence.

We must not only forego the pleasures of malevolence, but patiently and resolutely endure the *pains of benevolence*, particularly those of compassion. But we shall not be losers on either of these accounts. The pleasures of the moral sense which result from these virtues, will, in the first case, compensate for what we forego; in the last over-balance what we endure. Besides, mercy and forgiveness are in themselves pleasures; and, in the event, productive of many others; and compassion generally leads us to such conduct as makes the afflicted to rejoice, and increases our disposition to rejoice with them.

As benevolence is thus supported by many direct arguments, there are many similar and opposite arguments to prove that *malevolence is the lane of human happiness*; that it occasions misery to the agent as well as to the sufferer; that it is indefinitely inconsistent with itself, and with the course of nature; and that, consequently, it is impossible that it should subsist for ever. Now all these become so many indirect arguments for benevolence, and urge us to make the cultivation and exercise of it, one of the supreme pleasures and ends of our lives.

In order to make this appear more fully, we have only to take a survey of human life, the reverse of what we have already attended to. Injuries are increased by mutual injuries, till at last mutual sufferings oblige both parties to desist: the course and constitution of human nature give numberless admonitions to forbear; and the hand of every man, and the power of every thing, is against the malevolent. So that if we suppose a number of beings purely malevolent, and consequently to have an indefinite number of enemies, they would first cease from their enmity on account of their mutual sufferings, and become purely selfish, each being his own

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sole friend and protector, and afterwards, by mutual good offices, endear themselves to each other; so that at last each of them would have an indefinite number of friends, and thus would be indefinitely happy. This is, in part, mere supposition; but its obvious correspondence with what we see and feel in real life, is a strong argument both of the infinite goodness of God, and consequently of the tendency of all beings to unlimited happiness through benevolence. For the beings whom we have supposed to set out with pure malevolence, could no more rest at pure selfishness, or any other intermediate point, than they could at pure malevolence. And thus the arguments which exclude pure malevolence, united with the direct arguments for benevolence, necessarily lead us to infer that *pure unlimited benevolence should be the ultimate object of man.*

12. *Culture of Benevolence.*—In order to augment the benevolent, and suppress the malevolent affections, we should diligently practise all such acts of kindness, of friendship, generosity, and compassion, as our abilities of any kind extend to; and rigorously refrain from all sallies of anger, resentment, envy, jealousy, &c. For though our affections are not directly and immediately subject to the voluntary power, yet our actions are, and, consequently, through them, our affections. He that at first practises acts of benevolence by constraint, and continues to practise them, will at last have associated with them such a variety of pleasures, as to transfer a great instantaneous pleasure upon them, and produce in himself the affections from which they naturally flow. In like manner, if we refrain from malevolent actions and expressions, we shall dry up the ill passions which are the sources of them.

With the same objects in view, it will be of great use frequently to dwell upon the great pleasures and rewards attendant on benevolence; and also upon the many evils present and future, to which the contrary disposition exposes us. For thus we shall likewise transfer pleasure and pain by association upon these dispositions respectively; and rational self-interest will be made to produce pure benevolence, and to extinguish all kinds and degrees of malevolence.

Frequent and fervent prayer for others, friends, benefactors, strangers, and enemies, has a very great and decided tendency to augment benevolence, and to extinguish malevolence. All exertions of our affections cherish them; and those made under the more immediate sense of the divine attributes, have an extraordinary efficacy, in this respect, by mixing the love, awe, and other exalted emotions of the mind attending our addresses to God, with our affections towards man, so as to improve and purify them. Petitions for the increase of our benevolence, and the suppression of our malevolence, have the same tendency. Again, all meditations upon the attributes of God, and particularly upon his infinite benevolence towards all his creatures, have a strong tendency to refine and augment our benevolent affections. And, lastly, the frequent consideration of our own unworthiness, our entire dependence upon God, &c. raises in us compassion for others, as well as concern and earnest desires and prayers for ourselves. And compassion is, in this imperfect probationary state, an essential and principal part of our benevolent affections.

13. *Rules for the Conduct of Men in Society.*—Having now established the position, that benevolence should be a *primary* pursuit of man, it follows that we should aim to direct every action, so as to produce the greatest happiness and the least misery in our power. This is the rule of social conduct, which universal unlimited benevolence inculcates.

But the application of this rule in real life is attended with considerable difficulties and perplexities. It is impossible for the most sagacious and experienced persons to make any accurate estimate of the future consequences of particular actions, so as, in all the variety of circumstances which occur, to determine justly which action would contribute most to augment happiness and lessen misery. Instead, therefore, of this most general rule, we must substitute others less general, and subordinate to it, admitting of a more commodious practical application. Whatever rules are laid down for this purpose, it is obvious that their coincidence must add strength to each; and that when they differ, or are apparently opposite to each other, this difference or opposition must moderate or restrain their application. On the whole, however, the general result will prove the best direction for promoting the happiness and lessening the misery of others.

Hartley lays down the ten following subordinate rules: 1. That we obey the scripture precepts, in the natural, obvious meaning of them. 2. That we should pay great regard both to our own moral sense, and to that of others. 3. That in all deliberate actions we should take into account the probable consequences on each side. 4. That we are not to be guided implicitly by the mere impulse of compassion and good-will; yet that great regard should be paid to them in our conduct. 5. That we should place ourselves in the situation of all the persons concerned. 6. That persons in the near relations of life, benefactors, dependents, and enemies, seem to have, in most cases, a prior claim to strangers. 7. That benevolent religious persons have, all other circumstances being equal, a prior claim to the rest of mankind. 8. That we should contribute, as far as lies in our power, to the moral and religious improvement of others. 9. That we ought to pay the strictest regard to truth, both in our affirmations and in our promises. 10. That we ought to obey the civil magistrate and the laws of the community. These rules we think truly unexceptionable; and we shall follow the order of Hartley, enlarging on some of them as we proceed. Some considerations respecting the necessity of *general* rules of duty will be found in Div. IV. § 3.

(1) The first rule is, that we obey the scripture precepts in the natural, obvious meaning of them. The scripture precepts are indeed themselves the rule of life. There is, however, the same kind of difficulty in applying them accurately to particular cases, as in applying the above-mentioned most general rule, by means of an estimate of the consequences of actions. It is, from the nature of language, impossible, in many particular cases, to determine precisely the connection of the action with the precept. However, unless it would obviously lead a person to act in opposition to some or other of the following rules, it is the safest way, in the particular circumstances of real life, to recollect the scripture precepts, and follow them in their first and most obvious sense.

(2) Great regard must be paid, both to our own moral sense, and to that of others. Among those who have received a Christian education, this rule must coincide in a great measure with the foregoing. They are together the chief supports of all that is good, even in the most refined and philosophical, as well as in the vulgar; and therefore must not be weakened or explained away. It is well remarked, by a judicious moralist, that, in a mind whose moral powers have been cultivated, second thoughts are seldom the best. The first are the impulse of well-regulated feeling, and are produced instantaneously, without attention to all petty

petty suggestions of self, which crowd themselves in various ways into our mind, and by leading to doubt, and then, aided by inclination, to disobedience, prevent the efficacy of the conscience, and throw a mist over the before clear directions of duty. (See Dr. Aikin's Letters to his Son.) With respect to the moral sense of others, two motives should induce us to pay great regard to its dictates. The one is purely benevolent; we ought not to throw any moral impediment in the way of others; the other is, that prudence and humility direct, that we use the experience and the feelings produced by great moral culture as guides of our own conduct.

(3) It is very proper, in all deliberate actions, to weigh, as well as we can, the probable consequences on each side, and to suffer the balance to have some influence in all cases, and the chief influence where the other rules do not interfere much, or explicitly. But to be determined by our own judgments as to consequences, in opposition to the two foregoing rules, or to those which follow, is too probably the dictate of pride or self-interest. Though in some instances God speaks as plainly by the consequences of actions as he does by his revealed will, and though, without a doubt, if we were capable of seeing all, even the remotest consequences, we should, in all cases, perceive that the precepts of revelation are in perfect consistency with the course of Providence, yet it is a fact, that the wisest of men cannot trace all the consequences of any one moral or immoral action, and that in numerous instances we cannot see enough to enable us to form a decided idea as to the course of duty. Wherever the scripture precepts clearly apply to our own cases, we should be extremely cautious as to any inferences we may derive from the supposed consequences of actions in opposition to them; and at any rate we may rest satisfied that we cannot do wrong by obeying them. We are not answerable for the ill consequences, if such there be, of our obedience; but we are for those of disobedience; and in proportion to the strength and correctness of our consciences, will, most probably, be the conviction of our folly, and our regret for our pride and presumption.

(4) The impulse of the mere instantaneous emotions of good-will and compassion, will not always furnish a sufficient guide; at the same time they ought to have great regard paid to them, lest we contract a philosophic hardness of heart, by pretending to act upon higher and more extensively benevolent views than those of vulgar minds, or the more feeling sex, &c. Some, however, carry this much too far on the other side, and encourage many public mischiefs through a false, misguided tenderness to criminals, persons in distress through present vice, &c. Where feeling is thus made the guide of conduct, he who can best play upon the sympathy, and best decorate his tale of woe, will meet with a reward for his ingenuity, due only to the modest merit, which shrinks from the public view, or at least does not obtrude itself upon our notice. The injury done to society at large by this ill-directed compassion, so generally prevalent because it gratifies without trouble, is very great indeed; and while we have it in our power to cultivate compassion and sympathy, by the view and the relief of real misery and suffering worth, the desire of such cultivation will be scarcely sufficient to exculpate us, (when our minds have acquired some degree of comprehension,) from the charge of preferring a selfish indolent gratification to the good of others. To use the words of the elegant Stewart, "the dictates of reason and conscience inform us, in language which it is impossible to mistake, that it is sometimes a duty to check the most amiable emotions of the heart; to

withdraw, for example, from the sight of those distresses which stronger claims forbid us to relieve, and to deny ourselves that exquisite luxury which arises from the exercise of humanity."

(5) The rule of placing ourselves in the several situations of the persons concerned, and inquiring what we should then expect, is of excellent use for directing, enforcing, and restraining our actions, and for producing in us a steady constant sense of what is fit and equitable. This rule is so comprehensive, that it may be called the sum and substance of Christian morality, as it respects the social duties. It has been objected by some that it teaches nothing, since it does not shew what justice is; and that it is even an improper rule, for we ought not to do to others what we should wish them to do to us, but what we may justly expect them to do to us. But these objections have little or no force. The real object of the rule clearly is to serve as a criterion of duty which should counteract the impressions of self. We seldom need fear, lest we should carry our imaginary substitution to too great a length. Our only danger is, lest we should not go far enough; that we should admit of exceptions to this principle, which, if circumstances had been real, ought to have had no place. This rule of duty, says Dr. Reid, "comprehends every rule of justice without exception. It comprehends all the relative duties, arising either from the more permanent relations of parent and child, of master and servant, of magistrate and subject, of husband and wife, or from the more transient relations of rich and poor, of buyer and seller, of debtor and creditor, of benefactor and beneficiary, of friend and enemy. It comprehends every duty of charity and humanity, and even of courtesy and good manners."—"He who acts invariably by this rule, will never deviate from the principle of his duty, but from an error of judgment. And, as he feels the obligation that he and all men are under, to use the best means in his power to have his judgment well informed in matters of duty, his errors will only be such as are invincible." (Active Powers, Ess. v. ch. 1.) In order to apply this rule according to the obvious intention of the Christian lawgiver, we are first to consider what we should wish done to us, if we were in the place of the other person, and at the same time possessed of all the knowledge which we ourselves possess respecting the object under consideration. For instance, suppose a child requests from a parent, a gratification which the parent knows would, in some way or other, be injurious to him; is the parent to grant his request, because, if in the child's place, he would himself wish to be so gratified? The answer is clear; and so in similar instances. The fact is, in all such cases we are to consider, not merely what we might wish if in the situation of another, so as to have all his foolish desires, and his ignorance or misguided opinions; but what we should desire with all the means of knowledge which we actually possess, and with all the views we have of the reasonableness of the objects of desire, when not ourselves under the influence of passion or interest. The rule is not so much designed to *teach* us what is just and right, as to enable us to see and attend to what we do know; to make us think of the claims of others, and to overcome the promptings of selfishness. 2. We must farther consider, not only what we should wish for, and, as far as respects ourselves only, might reasonably wish for, if in the place of another, but also take into account what we should wish for, if in the place of those others whose conduct or happiness will be affected. Suppose, for instance, that a favour is requested which in itself considered is right and reasonable; we might consider

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consider the application of our Saviour's rule as necessarily directing us to grant it, because, if in the situation of the individual soliciting it, we might reasonably wish for success. But it may so happen, that by attending to his request, we may deprive ourselves of the power of discharging more important duties to others: we may be prevented from paying our debts, or from contributing as we ought to the welfare of those who have stronger claims upon us. Their claims must also be taken into account; but we must take care, that such calculations be not made under the bias of selfishness; and that, under the pretence of justice, we do not stifle the feelings of compassion and good-will. The doublings of self-love are so numerous and intricate, that he who has the sincere and earnest desire to do his duty, will be cautious where the promptings of interest or indolence, or other personal feelings are concerned. "Charity begins at home" is an excellent maxim; and he who neglects his home in order to do good to others, may reasonably expect that he will do more harm by such neglect, than he can do good in other ways; but we should also remember, that this maxim is often the prompting of self-love, to excuse our covetousness or our indolence; and where the good to others is present and certain, and the good to our narrow circle of domestic relations is distant and uncertain, the latter is not to be placed in competition with the former. On *candour*, an important and perhaps too much neglected branch of justice, the reader will find an interesting passage from Mr. Stewart's *Outlines*, in IV. § 1.

(6) Persons in the near relations of life, benefactors, dependents, and enemies, seem to have, in most cases, a prior claim to strangers. General benevolence arises from the cultivation of the particular sources of it. The root must therefore be cherished, that the branches may flourish, and the fruit arrive at perfection. Some remarks on a theory directly opposing this rule, will be found in IV. § 2.

(7) Benevolent and religious persons have, all other circumstances being equal, a prior claim to the rest of mankind. Natural benevolence itself teaches this, as well as the moral sense. Two reasons strongly enforce this rule; in the first place, we thus contribute towards the promotion of goodness; we add something to the strength of the motives which there are, even in the present life, for steady adherence to the practice of duty. If it be our aim to remove misery without discrimination, we shall in some instances break down the barriers of virtue; we cannot remove all; let our efforts, therefore, be so directed, that they may be as beneficial as possible; and it is obvious, that they will be most effectual, where they contribute to discourage vice in all its shapes. If indolence be secure of relief from that pressure which it places upon itself, indolence will be increased; if the appearance of misery be the only passport to our assistance, vice will be continually receiving encouragement. But it is not merely with a view to the relief of actual misery that discrimination is important; it is equally important with respect to the extension of the means of doing good. We may confidently expect, that all the opportunities and powers we can commit to others, will be most serviceable in the hands of those whose habits are formed upon the model of benevolent piety. In all cases, however, especially while our benevolence is in its infancy, we are in some measure to be guided by its mere impulse. It is one important consequence of doing good to others, that we do good to ourselves, we cultivate our benevolence, and with it cultivate our happiness. But that benevolence will be found to rest upon the surest footing, which is made to prompt to exertions which in no way interfere with the most extensive interests of mankind.

(8) Since the concerns of religion, and a future state are of infinitely more importance than those which relate to this world, it should be our most earnest object to contribute, as far as in us lies, to the moral and religious improvement of our fellow creatures. In various ways we have this power; and this is a field in which all can, more or less, employ their talents. Here no effort can be altogether thrown away; at least no effort will be prejudicial; and even if to others they should be useless, their effects will return to our own bosoms.

(9) We ought to pay the strictest regard to truth, both in our affirmations and promises. There are very few instances, where veracity of both kinds is not evidently conducive to the public good, and falsehood in every degree pernicious. It follows, therefore, that in cases where appearances are otherwise, the general regard to truth, which is of so much consequence to the world, ought to make us adhere inviolably to it; and that it is a most dangerous practice to falsify, pretended or real, as is often done, from false delicacy, false shame, and other such dissingenuous motives, or even from those which border upon virtue. The harm which these things do, by creating a mutual diffidence, and disposition to deceive, is exceedingly great; and in scarcely any instances to be counterbalanced by the present good effects assigned as the reason for this practice. On the supposed restrictions of this duty, see hereafter, IV. § 3.

(10) Obedience to the civil magistrate, and to the laws of the community, is a subordinate general rule of the greatest importance. It is evidently for the public good, that every member of a state should submit to the governing power, whatever that be. Peace, order, and harmony, result from this, taken on the whole: confusion and mischief of all kinds from the contrary. So that, though it may, and must be supposed, that disobedience in certain particular cases will, as far as the single act and its immediate consequences are considered, contribute more to the public good than obedience, yet as it is a dangerous example to others, and will probably lead the person himself into other instances of disobedience afterwards; disobedience becomes, in every case, upon the whole, of a tendency destructive of the public welfare. We ought, therefore, in consequence of this rule, to respect all persons in authority; not to pass hasty censures upon their actions; to make candid allowances on account of the difficulties of government, the bad education of princes, and of persons of high birth; and of the flattery and extraordinary temptations with which they are surrounded; to observe the laws ourselves, and to promote the observance of them where the penalties may be evaded, or are found insufficient; to look upon property as a thing absolutely determined by the laws, so that, though a man may, and ought to recede from what the law would give him out of compassion, generosity, love of peace, view of greater good upon the whole, &c.; yet he must never in any way evade, strain, or do violence to the laws, in order to obtain what he may think his own according to equity; and whenever he has offended, or is judged by lawful authority to have offended, he must submit to the punishment whatever it be.

This rule obviously does not extend to those extreme cases, where the people at large, (for whose benefit all power should be exercised, and on whose will it must eventually depend,) see reason to resist the exercise of usurped or arbitrary power, to change one line of sovereigns for another, or to place the existing monarch under those restrictions, which may prevent the abuse of his authority. In making such resistance, however, it should be clear, that the proposed change will meet with at least the concurrence  
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of the great bulk of the people, that the probabilities of success are adequate to justify the risks which must be run, and that the advantages to be gained will be such as to counterbalance the immediate evils; evils which must often check the ardour of enlightened and disinterested patriotism, and should be seriously weighed, not only in the more extensive cases, but even in those which merely respect the reformation of real or supposed abuses. The mass of suffering, and of moral evil produced when force must be employed to throw off an oppressive yoke, is utterly incalculable; and, on the whole, more is generally to be effected by the gradual diffusion of knowledge and of sound views of the nature and ends of political establishments, which must eventually, (and often much more rapidly than could be expected before hand,) set a complete bar to all injurious encroachments on civil liberty.

Nor does this rule extend to those important cases where the rights of conscience are concerned. If the laws of the civil magistrate require any thing which the law of God forbids, they must be neglected, or disobeyed, without hesitation.

Intimately connected with this subject is one point, to which we must briefly advert, *viz.* honesty with respect to the public revenue. Many who have a real principle of genuine uprightness in other respects, are loose in their practice in this; and it is, we fear, a mournful truth, that by the frauds and falsehoods which they have employed in connection with the revenue, great numbers have had their moral principles weakened, if not altogether perverted. How much such practices have a tendency to diminish mutual confidence, it is unnecessary to say. If we know that a man defrauds the revenue, contrary, it may be, to his own solemn declaration, we may hope, and perhaps see reason to believe, that he will not defraud or deceive in the common transactions of life; but our strong confidence that he will not must be greatly shaken. The pressure of national burdens cannot indeed but be deeply felt by individuals; but we ought ever to bear in mind, when we are disposed to aim to lessen its effects on ourselves, by unlawful concealment, or false declarations, &c. that we are thereby throwing an undue weight upon the more conscientious, and that we cannot do it without (as far as it is known or suspected) lessening the confidence of others in us, and loosening the bonds of society, nor without weakening our own moral principles; and even if we should satisfy ourselves, that, in the particular instance, we have equity, if not law on our sides, yet that we cannot employ our supposed right without fraud, if not deliberate falsehood, and perhaps even perjury. As long as we have the power of curtailing those expenses which respect show and luxury, or, at most, mere convenience, we have no plea of real necessity: and, after all, our pleasures and our pride are commonly our heaviest taxes.

Respecting those frauds on the public revenue, which come under the general head of smuggling, they cannot be too much deprecated. They almost solely respect articles of luxury, on which the same remark may be made as above; and, at any rate, smuggled goods cannot be purchased, without directly encouraging frauds and falsehood in others, and assisting to train up a set of desperate persons, who are thus prepared to make society in any manner the subject of their lawless prey: they cannot be purchased without increasing the burdens of the conscientious, nor without injury to the fair dealer. The direct tendency of some of our revenue laws is, in various ways, to weaken the restraints of duty; and the evil, for which individuals cannot be altogether answerable, should not be increased by

their own violations. If these remarks should meet the eye of any one of those respectable senators, who are concerned for the morality as well as present interests of the people, we earnestly solicit him to take into consideration the state of those laws in this particular point of view. We doubt not he will find that, in some cases, even the truly upright man, who is anxious to make no declaration but what is strictly true, can scarcely avoid departures from the exact truth, which are extremely painful to his own mind; and that those who are but little under such restraint, are continually led, by the forms and oaths of the custom-house, to breaches of truth, sanctioned by an appeal to God, which cannot fail to loosen the influence of an oath in all cases, and prepare the way for perjury in its worst forms. The effect of the whole, in its various ramifications, is a degree of moral injury which can scarcely be calculated: and while we experience heart-felt delight (not, however, unmixed with pain from present disappointment) at contemplating those exertions, which are designed to bring our penal law to a correspondence with the only justifiable ends of punishment, we should be disposed to place upon a level with them, efforts of the same enlightened, comprehensive, dignified, persevering nature, directed to the reformation of our revenue laws, where they unnecessarily affect the morals of the people.

Other rules, says Hartley, besides the ten foregoing, might be assigned, or these expressed in a different way. I have put down those which appear to be, in fact, the chief principles of social conduct to wise and good men. They must all be supposed to influence and interpret each other. Let a man only divest himself as much as possible of all selfish regards, and love his neighbour as himself, and God above all, and he will generally find some point, and that without much difficulty or perplexity, in which all these rules unite to produce the greatest good, upon the whole, to all persons concerned.

Though our plan and limits will not allow of our entering at length into the duties arising from the particular relations of social life, yet we deem the observations of Hartley, on the subject of the parental relation, so important, that we shall make an abstract of his leading statement. The principal duty of the parental relation is the giving of a right education, or the imprinting such associations on the minds of children, as may conduct them safe through this world to a happy futurity. In the latter respect there can be no doubt, because religion must on all hands be allowed to be the one necessary thing; and, in the course of these investigations respecting the primary pursuit of life, it appears that it contributes as certainly to give us the maximum of happiness in this world, at least the fairest prospect of it, as to secure it in the next: so that a parent ought to inculcate it in every point of view. The chief errors of education are owing to the want of a practical persuasion of this point, or to a false tenderness or opinion on the part of a parent, by which he is led to believe that the object does not require, in the case of his child, frequent corrections and restraints, with perpetual encouragements and incentives to virtue, by reward, example, advice, books, conversation, &c. If due care were taken from the first, little severity would ordinarily be necessary; but in proportion as this is neglected in the first years, a much greater degree of care, with high degrees of severity, both bodily and mental, become absolutely necessary to preserve from misery both here and hereafter. Affectionate parents should, therefore, labour from the earliest dawnings of understanding and desire, to check the growing obstinacy of the will; to curb all sallies of passion; to impress the deepest, most amiable, reverential,  
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and awful impressions of God, a future state, and all sacred things; to restrain anger, jealousy, and selfishness; to encourage love, compassion, generosity, forgiveness, gratitude; to excite and even oblige to such industry, as the tender age will properly admit. For one principal end and difficulty of life is, to generate such moderate, varying, and perpetually actuating motives, by means of the natural sensible desires being associated with, and apportioned to, foreign objects, as may keep up a state of moderate cheerfulness, and useful employment, during the whole course of our lives; whereas fenfual, blind, and uninformed desire presses violently for immediate gratification, is injurious to others, and destroys its own aims, or, at the best, gives way only to spleen and dissatisfaction.

14. *Estimate of the Pleasures of Theopathy.*—We now proceed to the important inquiry respecting the theopathic affections, what regard they claim from us in the formation of the rule of life. And here it appears that the love of God should be our primary pursuit, and ultimate end, because it regulates, improves, and perfects all the other parts of our nature, and affords a pleasure superior in kind and in degree to all the rest.

We have already seen the influence of the precepts of piety on the four inferior classes of human pleasures, those of sensation, imagination, ambition, and self-interest; but the precepts of piety are those which teach us what homage of our affections and external actions ought to be addressed to the Deity, in a direct and immediate manner. Now all the affections, enjoined by these precepts, terminate ultimately in the love of God, which, therefore, may be used in the same situations in which the term precepts of piety has been employed.

But in addition to this, it is obvious in a shorter way. The perpetual exertion of a pleasing affection towards a Being who is infinite in power, knowledge, and goodness, and who is also our friend and father, cannot but enhance all our joys, and alleviate all our sorrows. A sense of his presence and protection will restrain all actions which are excessive, irregular, or hurtful; will support and encourage us in all such as are of a contrary nature; and will infuse such peace and tranquillity of mind, as will enable us to see clearly and act uniformly. The perfection, therefore, of every part of our natures must depend upon the degree in which the love of God, and a constant sense of his presence, have obtained possession of the mind.

With respect to the support and regulation afforded by piety to benevolence, it may be observed that the love of our fellow men can never be free from partiality and selfishness, until we are able to view all things in the relation which they bear to God. If the relation to ourselves be made the point of view, our prospects must be narrow, and the appearance of what we do see, distorted. When we consider the scenes of vanity, folly, and misery, which present themselves to our view from this point; when we are disappointed in the happiness of our friends, or feel the resentment of our enemies, our benevolence will begin to languish, and our hearts fail us: we shall complain of the corruption and wickedness of that world which we have hitherto loved, with a benevolence merely human; and shew, by our complaints, that we are strongly tinctured with the same corruption and wickedness. This is generally the case with young and unexperienced persons in the beginning of a virtuous course, and before they have made advances in piety. The disappointments which human benevolence meets with, are sometimes apt to incline us to call the divine goodness in question. But he who is possessed of a full assurance of this, who loves God with his

whole powers, as an inexhaustible fountain of love and benevolence to his creatures, at all times and under all circumstances, as much when he chastises as when he rewards, will learn thereby to love enemies as well as friends, the sinful and miserable as well as the holy and happy; to rejoice and give thanks for every thing he sees and feels, however irreconcilable to his present suggestions; and to labour as an instrument under God, with real courage and constancy, for the promotion of virtue and happiness.

In like manner the conscience or moral sense requires a perpetual direction and support from the love of God to keep it steady and pure. When men cease to have a due regard for God, having some other end beyond which they do not look, they are very apt to relapse into negligence and callosity, and to act without any virtuous principle. And, on the other hand, if they regard him with slavish fear, they fill their minds with endless scruples and anxieties about the lawfulness of trivial actions.

Thus the love of God regulates, improves, and perfects all the other parts of our nature: but further it affords a pleasure superior in kind, and in degree, to all the rest of which our natures are capable.

(1) The love and contemplation of God in some measure render us partakers of the divine nature, and, consequently, of the perfection and happiness of it. Our wills may thus be united to his will, and therefore rendered free from disappointment: we shall, by degrees, see every thing as God sees it, that is, see every thing which he has made to be good. Though this can only be the case in part in the present world, yet it is well known that there have been those who have so far reached this perfection of our nature, as to acquiesce, and even to rejoice in the events of life, however apparently afflictive; to be freed from fear and solicitude; and to receive their daily bread with constant thankfulness. And though the number of these happy persons may have been comparatively small, and the path be not frequented and beaten, yet if the desire be sufficiently earnest, it is in the power of all to arrive at the same state, by sufficient earnestness and constancy in the use of the appointed means.

(2) The love of God may be considered as the central affection to which all the others point. When men have entered sufficiently into the ways of piety, the ideas of the Supreme Being recur more and more in the whole course and tenor of their lives, and, by uniting with all their thoughts and feelings, overpower all the pains, and augment and connect with themselves all the pleasures of the mind. Every thing beautiful and glorious brings in the ideas of God, mixes with them, and coalesces with them; for all things are from God, he is the only cause and reality, and the existence of every thing else is only the effect and proof of his existence and excellence. Let the mind be once duly imbued with this truth, and its practical applications, and every thing will afford exercise for the devout affections. Add to this their unlimited extent, their purity, and perfection, and it cannot but be acknowledged that they must be far superior to all the rest both in kind and in degree.

(3) The objects of other pleasures are frequently removed. No time, no place, no circumstance of life can deprive us of this. Our hearts may be directed towards God in the greatest external confusion, as well as in the deepest silence and retirement. All the duties of life, when directed to God, become pleasures; and by the same means every the smallest action becomes the discharge of the proper duty of the time and place. Thus time is turned

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to its best advantage : thus every situation and event of life may be converted into a source of present comfort and future felicity.

(4) When the love of God is thus made to arise from every object, and to exert itself in every action, it becomes of a permanent nature, suited to our present frame, and will not pass into deadness or disgust, as our other pleasures do from repeated gratification.

We should be glad if our limits would allow of our laying before our readers a view of those means which are pointed out by Hartley, for the culture of the theopathic affections, of *faith, fear, gratitude, hope, trust, resignation, and love* : we must, however, content ourselves with referring to his 72d proposition on this subject ; and to his important rules in the 73d proposition, concerning the manner of expressing them in prayer, and other religious exercises ; and shall only add the following observations, derived from the 73d.

There cannot be a more fatal delusion, than to suppose, that religion is nothing but a divine philosophy in the soul ; and that the foregoing theopathic affections may exist and flourish there, though they be not cultivated by devout exercises and expressions. Experience, and many plain obvious reasons, shew the falsehood and mischievous tendency of this notion ; and it follows from the theory of association, that no internal dispositions can remain long in the mind, unless they be properly nourished by proper associations, that is, by some external acts. This, therefore, among others, may be considered as a strong argument for frequent prayer.

In section 10, (entitled Estimate of the Pleasures of Self-interest,) we referred to Dr. Priestley's sermon on the duty of not living to ourselves ; we shall here copy a few paragraphs from it, which the reader will perceive to bear closely upon this, and upon the 10th section, and for which, if not before familiar to him, we persuade ourselves we shall have his thanks.

"Every day passed in the steady and earnest discharge of a man's known duty, will pass with uniform cheerfulness and alacrity. And in the glorious animating prospect of a future happy state of mankind, on which, in a humble trust and confidence in the assistance and grace of God, he has spent all his cares, and exerted all his powers, that joy will spring up in his heart here, which will hereafter be unspeakable and full of glory.

"If troubles and persecutions arise on account of our adhering to duty ; if we be opposed in the prosecution of laudable undertakings, or suffer in consequence of undertaking them ; the true piety of a person who habitually lives to God, and not to himself, is capable of converting them all into pure unmixed joy and transport. Then the human mind roused to the most intent exertion of all its faculties, burdened with no consciousness of guilt, referring itself absolutely to the disposal of its God and father, distrustful of its own powers, and confiding in the infinite power, wisdom, and goodness of God, acquires a fervour of spirit, a courage, fortitude, and magnanimity, tempered with the most perfect serenity, and the greatest presence of mind, that is sufficient, and more than sufficient, to bear a man through every difficulty, and even to convert all pain into pleasure. His highly agitated state of mind, in those trying circumstances, is almost pure rapture and extacy.

"What the extraordinary exercises of devotion are able to do upon extraordinary occasions, the habitual moderate exercise of piety will be able to do in the ordinary course, and the common troubles of our lives ; so that it may not only be compared to a strong cordial, to be applied when the

mind is ready to faint under adversity, but to that food which is the daily support of our lives.

"To have God always in our thoughts, is not possible in this world. Present objects, to the influence of which we are continually exposed, must necessarily engage a great part of our attention ; and worldly objects, by continually engrossing our thoughts, are apt to become of too great importance to us. We grow anxious about them, and our minds are harassed and fatigued with a constant and close attention to them. Now, it is when the mind is in this state, or rather tending towards it, that the benign influences of devotion are, in the ordinary course of our lives, the most sensibly felt ; when the mind, looking off, and above, all worldly objects, and deeply impressed with a sense of the infinite power, wisdom, and goodness of God, unburdens itself of every anxiety, and casts all its cares upon its heavenly father ; and when the preceding tumult and disorder of the passions only serve to augment that unspeakable joy, satisfaction, and confidence, with which a deep sense of the presence and providence of God inspires the soul.

"The relief a benevolent mind feels from communicating its troubles and cares to an intimate friend, in whose wisdom and integrity he can confide, though of the same nature, is but a faint image of what the truly pious soul feels in the delightful seasons of the devout intercourse which he maintains with his God.

"This is a perpetual source of joy and satisfaction to a truly devout mind, which the wicked, those persons who live to themselves, and not to mankind, or to God, intermeddle not with. Not even an idea of that sweet tranquillity, exalted joy, and calm fortitude, which true devotion inspires, can be communicated to another who hath had no experience of it himself. This is true of those things of which St. Paul says that the natural man cannot comprehend them, and that they are foolishness to him, because they are spiritually discerned.

"I would be no advocate for enthusiasm. The fervour of devotion cannot always be kept up. That is inconsistent with the condition of our nature, and far from being necessary in our present state ; but that cheerful serenity and composure in which moderate acts of devotion leave the mind, is an excellent temper for entering upon, and persevering with spirit and alacrity in any useful and honourable undertaking."

This religious philosopher then proceeds, in reference to the general object of his discourse, in the following words.

"The sum of this practical doctrine, suggested by revelation, and confirmed by reason and observation, is, that *no man can be happy who lives to himself* ; but that true happiness consists in having our faculties wholly engrossed by some worthy object, in the pursuit of which the strongest and best of our affections have their full play, and in which we enjoy all the consistent pleasures of our whole nature ; that though a regard to our greatest happiness be of excellent use, particularly about the beginning of our progress towards perfection and happiness, in bringing our inferior appetites and passions into due subjection to the superior powers of our nature, yet that self-love, and a regard to ourselves, is very apt to grow too intense, and is, in fact, the cause of a great deal of the useless anxiety, perplexity, and misery which is in the world ; and that therefore it ought to be our care, that our minds be engrossed as much as possible by other objects ; and that even motives to virtue which turn our attention frequently upon ourselves should be used with caution, for fear of feeding that vanity and self-conceit which we ought to study every method of repressing, as the greatest bane of true religion, being most opposite to the

the genuine temper of Christianity, and most destructive of human happiness."

15. *Estimate of the Moral Sense.*—It has been already stated, that the moral sense ought to have great influence even in the most explicit and deliberate actions; hence the culture of its feelings, and the correcting of its dictates, should be made a primary object.

Further, the moral sense ought, on urgent occasions, to have the sole influence; and this for several reasons. 1. Because it offers itself on the various occasions of life, with the tone of authority. It warns us before hand, and calls us to account afterwards; it condemns or approves; it rewards by the pleasures of self-approbation, or punishes by the pains of self-condemnation. 2. The moral sense is principally generated by piety, benevolence, and rational self-interest. All these are explicit guides in deliberate actions; and since they are excluded, on sudden occasions, through the want of time to weigh and determine, it is highly reasonable to admit the moral sense formed from them, and whose dictates are immediate, as their substitute. 3. The greatness, the permanency, and the calm nature, of the pleasures of the moral sense, with the horrors and the constant recurrence of the sense of guilt, are additional arguments to shew that these pleasures and pains were intended as the guides of life.

The perfection of the moral sense consists in the four following particulars: 1. That it extend to all the actions of moment which occur in the intercourses of real life; and be a ready monitor on all such occasions: 2. That its pleasures and pains should be so vivid as to furnish a very strong excitement to shun vice, and to walk steadily in the path of religious duty: 3. That it should not descend to trifling or minute particulars; for, though scrupulosity is probably a necessary step in the progress of the mind to moral excellency, yet, if it continue, and become the prevailing habit of the mind, it will check benevolence, and turn the love of God into a superstitious fear: 4. It is necessary that the dictates of the moral sense should be perfectly conformable to piety and benevolence, of which it may be considered as a substitute.

In order to obtain the most perfect state of the conscience, it is necessary for us to be much employed in the practical study of the sacred scriptures, and of the writings of good men of all denominations; in observing the living examples of moral worth, and in the perusal of moral and religious biography; in self-examination; in prayer, and other exercises of devotion; in endeavouring to convert all the social and religious affections into the love of God; in aiming to acquire a truly charitable and benevolent spirit; and in walking faithfully, according to the dictates of benevolence, piety, and the moral sense, such as they are at present. Some of these directions are more particularly suited to correct one defect in the moral sense; some, another; but they will all conspire in purifying and perfecting it. On the origin, growth, and culture of the moral sense, we beg leave to refer the reader to *MORAL Education*, IV.; and we strongly recommend the perusal of Hartley's General Corollaries, at the end of his investigations respecting the Rule of Life.

16. *A strict regard to the precepts of Benevolence, Piety, and the Moral Sense, favours even gross Self-interest, and is the only method by which the refined, and the rational, can be secured.*—Here we may observe, 1. That since the regard to benevolence, piety, and the moral sense, procures the pleasures of sensation, imagination, and ambition, in their greatest perfection on the whole, it must favour gross self-interest, or the pursuit of the means of obtaining them.

2. This regard has, in many cases, an immediate tendency to procure these means, that is, to procure riches, power, learning, &c. and though it sometimes happens that a man must forego both the means of obtaining pleasure, and pleasure itself, from a regard to duty, and often happens that the best men have not the greatest share of the means; yet it seems that the best men have, in general, the fairest prospect for that competency, which is most suitable to real enjoyment. Thus, in trades and professions, though it is seldom observed that men eminent for piety and charity amass great wealth, yet they are generally in affluent or easy circumstances, from the faithful discharge of duty, their prudence, moderation in expences, &c. and scarce ever in indigent ones. A sense of duty produces a desire to discharge it: this recommends to the world, to the bad as well as to the good; and where there are instances apparently to the contrary, farther information will generally discover some secret pride, negligence, or imprudence, that is, something contrary to duty, to which the person's ill success in respect of this world, may be justly ascribed. 3. A regard to duty plainly gives the greatest capacity for enjoyment; as it secures us against those disorders of body and mind, which render the natural objects of pleasure insipid or ungrateful. 4. As to refined self-interest, or the pursuit of the means for obtaining the pleasures of sympathy, theopathy, and the moral sense, it appears at first sight, that a due regard to these must procure for us both the end and the means. 5. However gross or refined self-interest may, upon certain occasions, be disappointed, the rational one never can whilst we act upon a principle of duty. Our future happiness must be secured thereby. This the profane and profligate, as far as they have any belief of God, providence, or a future state, (and it is scarcely possible for a rational being to arrive at more than scepticism and uncertainty in these things,) must allow, as well as the pious Christian. And, when the rational self-interest is thus secured, the disappointments of the other two become far less grievous, and make far less impression on the mind. He that has a certain reversion of an infinite and eternal inheritance, may be very indifferent about present possessions.

17. *Practical Observations on Self-interest and Self-annihilation.*—Self-interest being reckoned by some writers the only stable point upon which a system of morality can be erected, and self-annihilation by others the only one in which man can rest, I will here (says Hartley, prop. 67.) endeavour to reconcile these two opinions, giving at the same time both a general description of what passes in our progress from self-interest to self-annihilation, and some short hints of what is to be approved or condemned in this practice.

(1) The vicious pleasures of sensation, imagination, and ambition, being often very expensive, are checked by the grossest of all the kinds of self-interest, the mere love of money; and the principle upon which men act in this case is esteemed one species of prudence. This may be tolerated in others, where it is not in our power to infuse a better motive; but, in a man's own mind, it is very absurd to have recourse to one, which must leave so great a degree of impurity, when others which are purer and stronger, rational self-interest particularly, are at hand.

(2) The desire of bodily and mental accomplishments, and in particular of science and learning, considered as means of happiness, often checks both the forementioned vicious pleasures, and the love of money. Now this kind of self-interest is preferable to the last indeed; but it cannot be approved by any that are truly solicitous about their own reformation and the purification of their motives.

(3) Gross self-interest sometimes excites persons to external acts of benevolence, and even of piety; and though there is much hypocrisy always in these cases, yet an imperfect benevolence or piety is sometimes generated in this way. However, one cannot but condemn this procedure in the highest degree.

(4) As refined self-interest arises from benevolence, piety, and the moral sense; so conversely it promotes them in various ways. But then, as it always checks their growth in various other ways, it cannot, in many cases, be allowed; and is, upon the whole, rather to be condemned than approved. More favour may be shewn it, where it restrains the vicious pleasures of sensation, imagination, and ambition.

(5) Rational self-interest excites us to all the proper methods of checking the last-named vicious pleasures, as well as gross and refined self-interest, and producing in ourselves the virtuous dispositions of benevolence, piety, and the moral sense. This part of our progress is extremely to be approved, and especially the last branch of it.

(6) The virtuous dispositions of benevolence, piety, and the moral sense, and particularly that of the love of God, check all the foregoing ones, and seem sufficient utterly to extinguish them at last. This would be perfect self-annihilation, and resting in God as our centre. And upon the whole we may conclude, that though it be impossible to begin without the pleasures of sensation and the selfishness founded upon them, or to proceed without the other intermediate principles, and particularly that of rational self-interest; yet we ought never to be satisfied with ourselves, till we arrive at perfect self-annihilation, and the pure love of God.

III. We now proceed to the third object proposed, *viz.* to state what *criterion of virtue and fundamental principle of duty*, we deem, from the foregoing views, most suitable to the moral condition of human nature, and most likely to lead to its highest excellence.

We have already stated, (near the close of our *first* division,) that the *ultimate obligation*, the *best rule*, and the *immediate motive* of virtue, are three distinct considerations; and we apprehend, that owing to this distinction not being kept sufficiently in sight, much confusion has arisen in moral investigation.

On the worth and purity of our motives, depends entirely the value of any action as far as the individual himself is concerned: and that rule of duty must be the best, which is itself the best *guide* of duty, and at the same time is the most likely to lead to those motives, which, in proportion as they have the chief actuating influence in the mind, exalt it towards the highest point of human excellence. The best rule of duty will of course supply the best *criterion* of virtue, in other words, the best test by which to determine whether an action or disposition is entitled to the denomination of virtuous.

Though we set out with the position, that the agent's greatest happiness on the whole is the remotest obligation of virtue, yet it is clear, from the foregoing considerations, that this is not a motive on which the mind can rest without checking its moral progress. It cannot be made a primary motive, without defeating its own end (see II. 10.) It is equally clear, that an habitual regard to one's own greatest happiness on the whole, as the sole end of actions and dispositions, would be continually misleading us from that path, by which alone we can reasonably expect to reach the object. It cannot, therefore, be made the criterion of virtue.—When it is once ascertained, that a strict regard to the dictates of piety, benevolence, and the moral sense, are the best means of promoting our greatest welfare, we have nothing to do but to obey them, with the

security, (if we think at all about it) that thus all will be well for us. To shew that a certain course of conduct is our duty, is a good way of proving that it will promote our greatest happiness on the whole: and, in fact, taking a future life into account, we have no other means of proving it; for nothing can be more certain, than that it is only by a faithful endeavour to discharge our duty, that we can obtain happiness in a state of retribution. That, therefore, cannot be made a criterion of duty, for which duty does itself afford the best criterion.

From the considerations in the foregoing paragraph it necessarily follows, that the tendency to promote the agent's greatest happiness on the whole, though it has been shewn to be the remotest source of obligation, cannot be the best criterion of virtue, any more than the best motive to the practice of it. Indeed it would be absurd to employ that as the mode of judging respecting our duty, which duty, as well as a regard to our own greatest happiness, requires to be made only a subordinate motive to the discharge of it, and which in the highest stages of moral excellence will be entirely left out of sight as a motive.

On this ground, we cannot accord with Mr. Belsham's statement in p. 432 of his *Elements*. "Hence it follows, that *there can be but one rule of right*, namely, the tendency of an action or affection to the ultimate happiness of the agent, or what completely coincides with this, under the government of perfect wisdom and benevolence, to the greatest general good; and all distinctions between what is commercially, legally, politically, &c. right, and what is morally or theologically right, are groundless, absurd, and in practice highly pernicious." The last part of the paragraph is unexceptionable and important; the position, which we have put in italics, in the unlimited and unqualified way in which it is expressed, is erroneous, and liable to great and injurious perversion. The effect of an action or affection on the ultimate happiness of the agent, must itself be dependent on the will of God: that will must undoubtedly spring from infinite benevolence and perfect rectitude; but a rule, which is itself dependent upon another, cannot be the *only* rule of right, and from what we have already stated, it cannot be the best.

It may often be convenient to employ some one of the extensive criteria of virtue as, in fact, a means of applying the most general and best criterion: just the same as in order to apply the most general rule of benevolence, we find it convenient to employ some rules of less extent as means of judging what benevolence really requires (see II. 13.); but no quality or effect of virtue can be admitted as the ultimate or even the best criterion, which is in any way arbitrary or dependent upon peculiarities in the mental or moral character of the individual applying it, which will not include all species of virtue, or which cannot itself be made a primary motive to the performance of it. If any criterion of virtue can be laid down which is self-consistent, universal, invariable, authoritative, easily applicable, itself excellent as a motive, and perfectly and obviously consistent with the remotest obligation, that must be the *best* criterion or rule of duty.

These principles completely exclude all considerations founded solely on a regard to our own present welfare; all views of individual interest, utility, expediency, &c. If the tendency of virtue to our own greatest happiness on the whole, is not the best criterion of virtue, its tendency to more limited degrees of happiness cannot. The tendency of virtue to promote our present welfare is often a good guide; and as a subordinate rule may be admitted with advantage. In one point of view it is even superior to the tendency of virtue to promote our greatest happiness on the whole;

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whole; because of this we can decide but imperfectly, and only by taking the will of God into account: the present effects of virtue are often obvious to all possessed of any tolerable degree of experience and good sense. But as the present effects of virtue are often in opposition to immediate interest and pleasures, and its most valuable influence on human happiness cannot be thoroughly discerned except by the virtuous themselves, they cannot furnish more than a subordinate test of duty, and are at the same time in opposition to the highest, so far as they tend to fix the mind upon themselves as motives.

The tendency of virtue to promote the good of others, though, perhaps, in a greater or less degree, directly or indirectly, an invariable quality of virtue, yet is far from being easily applicable, except to those branches of virtue which do not immediately respect our fellow creatures: it is often remote, indirect, and subordinate. Besides, if this tendency were assumed as the test of virtue, it would have little authority; it would carry with it little obligation, in those branches of self-regulation and piety which do not obviously affect the interests of others. The conformity of actions and dispositions to *benevolence*, is an excellent and extensive criterion of duty; but we are seeking for that which may be truly called *THE criterion* or rule of duty. Benevolence has a great advantage over the preceding rule, because it cannot too much operate as a motive; it often has a powerful influence in the exercise of the personal virtues, and when supported by the views of religion, must always appear to be consistent with the individual's own highest welfare: but it will not appear to include every species of duty without a greater degree of moral comprehension, than can be expected before a high degree of moral worth has been acquired.

Nor can a conformity to *justice* be justly deemed the criterion of virtue; not even in the sense in which it is taken by the author of *Political Justice*, (b. ii. ch. 2.) who, as Mr. Belsham observes, (*Elements*, p. 442.) makes it express "benevolence under the direction of wisdom." A disposition to render unto *all* their due, will, in a variety of cases, perfectly coincide with benevolence, and contribute to prevent the erroneous directions of this affection; and the conformity to justice may with great advantage be made a criterion of social virtue, but no farther. Justice as a criterion of duty in general is more defective than benevolence; because benevolence has more influence over the dispositions, and will operate more extensively as a motive, in those cases of duty which are not directly social, and where justice does not appear to afford any direction, except through the medium of benevolence. Godwin does, indeed, "assume the term *justice* as a general appellation for all moral duty," (clearly by this and his subsequent statements excluding from the class of moral duty, the divine and personal virtues); and he defines justice (p. 127.) to be "that impartial treatment of every man in matters that relate to his happiness, which is measured solely by a consideration of the properties of the receiver, and the capacity of him that bestows:" but he afterwards (p. 150.) gives a much more comprehensive account of *virtue*, which he defines "to be any action or actions of an intelligent being, proceeding from kind and benevolent intention, and having a tendency to contribute to general happiness." According to this, together with his previous theory, *virtue* is justice in action, springing from benevolence in principle: but it is clear that even this cannot reach the virtues which respect God and ourselves; because though benevolence may prompt to them, it cannot be said, with any propriety, (nor, we imagine, would Godwin have intended to say,) that they are a branch of justice, especially as he has himself defined it.

If the conformity of actions, &c. to the dictates of the *moral sense*, to the perceptions of the *understanding*, and so on, be made the criterion of duty, it must, from the very nature of those mental principles or powers, as we find them actually existing in the human mind, be an unsteady, ever-varying guide. The directions of the well cultivated *understanding*, or of the well regulated *conscience*, especially of the latter, are often a good means of judgment; but it is only when they accord with the directions of a still higher and more authoritative principle; and they do not, therefore, possess those qualifications which would entitle them to be made the ultimate criterion of duty.

Still less can the congruity, fitness, propriety, beauty, &c. of actions or dispositions, be made more than one criterion of moral worth. The perception of these qualities depends upon the correctness and extent of the *understanding* and the *moral powers*; and they are, therefore, more exceptionable than the foregoing as criteria of duty.

The fact is, the idea associated with the term *virtue*, or *rectitude*, or *moral worth*, is so exceedingly complex, formed of so many notions and feelings, that no definition can directly include them all. All that can be expected from a definition is, that it shall include every object to which the term can justly be applied, and exclude every other: but in such a case as this, at least, it is in vain to look for one which shall bring into view all the associated circumstances. These will depend upon the mental and moral character of the individual, upon his experience and observation, &c. And it is owing to inattention to this circumstance, that so many definitions have been given, in reality, essentially defective, though, through the unobserved influence of other views, not excluding in the minds of those who have laid them down, classes of human conduct and dispositions which are certainly a part of moral excellence, but to which those definitions do by no means extend.

Paley's definition (vol. i. p. 41.), which is copied from Gay's Preliminary Dissertations, is peculiarly defective, yet at the same time redundant. "Virtue," he says, "is the doing good to mankind, in obedience to the will of God, and for the sake of everlasting happiness. According to which definition," he continues, "the good of mankind is the subject; the will of God, the rule; and everlasting happiness, the motive of human virtue." Paley had good reason to be pleased with Mr. Gay's Dissertations; for they contain many judicious and valuable observations on the foundation of morals; but those who read them subsequently to their study of the Hartleyan philosophy, can scarcely fail to be struck with the progress which has been made in moral and mental investigation since the author wrote; and if Paley's acquaintance with the principles of mental science had been more precise and extensive, it may reasonably be supposed that his clear judgment would have framed a definition much more satisfactory than the one he has adopted. In the first place, what he terms the *subject* of virtue is radically defective; it excludes, because it does not include, the personal and divine virtues; and yet, in the very next page, he speaks of the division of *virtue* into the duties towards *God*, towards other men, and towards *ourselves*. It is clear, nevertheless, that Paley's definition does not include reverence, gratitude, chastity, temperance, &c. Next, his mode of stating his *rule* is inaccurate. If it is said that we do a thing *in obedience* to the will of another, it is obviously implied that we not only do it conformably to his will as a rule, but having the intention to obey it as our *motive*. As the expression stands, it excludes from the character of virtuous, every action which is not influenced, directly

rectly or indirectly, by the disposition to obey God; and is liable to the objection which we shall hereafter make to a definition much more satisfactory than Paley's. If it were designed to represent the influence of religious obedience as an essential part of virtue, it excludes a vast deal of what is usually regarded as justly included under the appellation. If *in obedience* were intended, as we suppose, to imply no more than *conformably* to the will of God, it must be regarded as an important verbal inaccuracy; and the expression for which it stands, would have rendered unnecessary the statement of the *subject* of virtue. If the *will of God* be the *rule* of virtue, *conformity* to that rule, in its various objects, must be virtue itself; and if this had been taken as the criterion of virtue, it would have been equally needless and embarrassing to introduce any specification of those objects. As to the *motive*, this is still more objectionable than the *subject*; for it excludes, not only the virtuous actions of those who do not believe in a future state, but even those which spring from a *disinterested* regard to the welfare of others, to the will of God, or to the dictates of conscience; that is, when an action becomes the most virtuous, according to the definition which Paley has adopted, it ceases to be virtuous.

We know of no criterion of moral excellence, which possesses the qualification above-stated as requisite to make it the standard of duty, except the will of God; and we now proceed to those considerations by which we are led to regard the conformity of actions or dispositions to the will of God, as the best criterion of virtue or rule of duty.

The will of God may be regarded as the *rule* of duty or as the *motive* to the performance of duty; but there never, perhaps, was an instance, in which the two views were not united in the actual employment of it. He who honestly makes the will of God his rule of duty, can scarcely avoid perceiving that it is his duty to act under the influence of an habitual regard to his will, and (while he endeavours to guide his conduct and his dispositions by the commands of God) to make the desire of his approbation and the fear of his displeasure, his direct and constantly actuating motives in the regulation of heart and life. On the other hand, he who is really and habitually influenced by the desire to obey the divine will, cannot but be led by that desire to use every means in his power to know what is his will; if he sincerely and heartily desire to obey God, he will make what he knows of his will the rule of his life. In short, if the desire to obey the will of God operates powerfully in the heart, the will of God will be made the guide of duty; if the will of God is sincerely and heartily made the guide of duty, the desire to obey the will of God must necessarily operate powerfully as a motive.

We shall not attempt to preserve any marked distinction between the will of God considered as the rule of duty, and considered as the motive to the performance of it; we shall not, however, lose sight of our immediate object, and shall have principally in view to shew, that the will of God is the best criterion of duty, in other words, the best guide of moral conduct. At first sight it really appears unnecessary in any way to attempt to prove this. It seems a self-evident maxim, that the will of an infinitely wise, powerful, and good being, upon whom we are constantly and absolutely dependent, must afford the best guidance to his weak and erring creatures; and it is probable that no consistent and serious believer in the existence of such a being, can entertain a doubt, that wherever the divine will is known, it is our duty to obey it, and that it cannot but be for our interest and happiness to obey it. But the fact is, that in a

variety of instances we are left, even with all the aid of revelation, to ascertain the will of God from the subordinate criteria of virtue; and as these often afford satisfactory grounds of decision, and some of them bring into view motives which form an essential part of moral excellence, the mind is too apt to rest upon them as themselves the foundation of duty, where it would be well to seek one more extensive and invariable.

When we consider the speculations of philosophers on the subject of moral obligation, and the rule of duty, and observe the great diversity which exists among them as to the theory of virtue, we might naturally expect to find great difference in the application of their system to the practical principles of morality; but where they have been in any considerable degree guided by the morality of the gospel, it will seldom be found that they differ widely on any essential point. Yet it is not a matter of slight importance what we lay down for ourselves as our fundamental principle of duty; some principles are more confined, others more accommodating; and our views of duty will usually be found to be clear, extensive, correct, and impressive, in proportion as the principle is so which we employ as our foundation.

We do not wish to go so far as one excellent writer has done, and say that virtue is *voluntary obedience* to the will of God. Undoubtedly every act of obedience to the divine will is an act of virtue; but an action may surely be virtuous, which does not include an explicit reference to the will of God, which is not produced by the immediate operation of a regard to his will. We admit that where the mind is habitually under the influence of a regard to the divine will, it will operate directly or indirectly in almost every action, and in almost every instance of the exercise or restraint of the affections: but should we therefore deny the character of virtuous to actions in themselves right where the motive also was right; for instance, a strong sense of duty, a disinterested desire to promote the happiness of a fellow creature,—or should we deny the character of virtuous to such motives or dispositions,—though, for the time at least, there was no direct intention of obedience to the divine will, or even any idea at the time in the mind that we were, in reality, acting agreeably to the will of God? We admit, again, that the character of the action is greatly heightened, if it not only spring from a sense of duty, and a desire to do good, but also from the belief that it was agreeable to the divine will, and the desire to obey it; indeed it has then reached the highest point of excellence; but we contend that an action is truly virtuous if it be in itself right, *i. e.* conformable to the will of God, and spring from a sense of duty, or a desire to do good; and this in proportion as these motives are pure, *i. e.* free from a regard to our own real or supposed good. The excellent writer to whom we have referred (Pearson in his remarks on Paley), has taken as a definition of virtue, one which only includes the perfection of virtue. We can think of no higher degree of it, than what he lays down as essential to it, voluntary obedience to the divine will. It was the distinguishing excellence of our Saviour's character, that it was his habitual object and aim to do the will of God; and in so far as his disciples imbibe the spirit of their venerated Lord, they will approach that height of excellence in which the will of God will be their will, and his glory their chief aim. But if we refuse the character of virtue to all actions but those which directly spring from this ennobling motive, we must not only say that the speculative atheist cannot be in any degree virtuous, however much he may act from a sense of justice, of benevolence,

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&c. but must deny the appellation of virtuous to the most worthy, just, generous, or humane actions of those who, while they believe in the existence and government of God, yet have little, if any, explicit regard to his will. Their virtue is defective, both in its extent and in its worth. Their characters want that grand quality which is essentially requisite to complete excellence, and which would not fail to give them stability and purity, but in so far as they observe the laws of benevolence, truth, uprightness, temperance, &c. from a sense of duty, a desire to do good, or any other motive *conformant* with the will of God, their conduct is virtuous, and their motives are virtuous also. The real excellence of Pearson's principles of morality, which have their foundation in religion, in a regard to the will of God, will be preferred, if we define *virtue* to be *the conformity of disposition and of actions which result from them to the will of God.*

And here we must observe, before we proceed, that the views of duty which revelation unfolds to us, will not allow us to separate actions from their motives, when we speak of them as virtuous. Actions may, in themselves considered, be right, and yet, as far as respects the agent, have no moral character, because they spring from no worthy principles within: they may, as far as respects the agent, be even sinful, because, though right in themselves, they spring from sinful motives; for instance, the libertine may afford pecuniary aid to a distressed family, in order to gain the confidence and ruin the happiness of one of its dearest members. On the other hand, right motives cannot make a wrong action right. The agent may not be culpable, since his conduct might be wrong solely through unavoidable ignorance; but though his motives may excuse him in the sight of God, they cannot alter the nature of his conduct. The persecutor may really be influenced by the idea of doing God service, and may suppose that what he does is right; but his acts of persecution are not thereby deprived of their real character; they are wrong, and can be made right by no motives whatever. For an action to be entitled to the appellation of virtuous, it must not only be right, that is, conformable to the will of God, but it must spring from right motives, that is, such as are conformable to the will of God. On this point it might not be useless to enlarge, but we must proceed with our leading object, referring to Mr. Belsham's 7th section, entitled "The Moral Value of an Action estimated;" and also to Dr. Price's "Review of the principal Questions and Difficulties on Morals," ch. 8 and 9. How far we agree with these writers, the intelligent reader will easily perceive: but we cannot avoid adding, that Dr. Price's views of duty, though we think he would occasionally have altered them, if he had attended more to the real nature of the human mind, are so refined and exalting, that the careful consideration of them can scarcely fail to make a person wiser and better. Though out of place here, we will add, that we find some of our statements respecting the understanding in *Mental Philosophy*, correspond beyond our previous expectations with the ideas of Dr. Price in his first chapter. The correspondence is the more satisfactory to us, as our views on other points materially differ from his.

(1) By making the will of God the criterion of virtue, in other words, our rule of duty, we do, in fact, include every other criterion of virtue, or rule of duty, that is in itself reasonable and just. If it is urged that the dictates of conscience should be our rule of duty, we say, that from attentive consideration of the nature of man, as well as from the declarations of revelation, it is clear that the conscience was intended by the great Author of our frame to be our guide in all cases of emergency, and to have great

influence in every department of duty, but that without due care and culture it may and often is erroneous and defective: that therefore it is not safe as an exclusive guide of duty, but should itself be put under the direction of the still higher principle, the will of God: that we should enlighten the conscience by the law of God, and other intimations of his will, and then submit implicitly to its direction; but that it is only where its directions are in conformity to the will of God, that it is our duty to obey it. The will of God is at last the point to which we must come, if we would judge how far the dictates of conscience ought to govern us: and though these do of themselves often afford us much light as to the will of God, though they may sometimes be our only direct guide as to the conduct which will be acceptable to him, and in all cases should receive great attention, yet it is only so far as we have reason to believe the conscience to be conformable to the will of God, that obedience to it is our duty: and the will of God should therefore be our chief guide of duty, and should be employed to regulate, correct, refine, and extend the dictates of this subordinate principle. Suppose, again, that the beneficial tendency or utility of actions and dispositions be made the rule of duty, we reply, that in so far as they really have this beneficial tendency, they must be conformable to the will of God, and that therefore this rule is also included under the rule which should be employed as our grand and invariable guide. The beneficial tendency of actions, &c. may sometimes be our only guide as to the will of God, and may often aid us in the application of the scripture precepts of duty, and still more frequently may serve to shew us the grounds and reasons of these precepts, their importance, and subserviency to the welfare of mankind: but the supposed tendency of actions can never be put against the law of God as delivered to us by revelation, and should not therefore be made our chief rule. The same may be shewn of every other criterion of virtue or rule of duty: as far as it is self-consistent, consistent with other principles of duty, and really just and useful, it cannot fail to be included under that one which it is alike our wisdom and our duty to make the invariable guide, the will of God. That by which all other principles of duty must be tried, should itself be employed as our constant standard of right and wrong.

(2) The will of God affords a criterion of duty which is absolutely *universal*: it extends to every part of the external conduct, and to every internal disposition. Some rules of duty leave out of sight important branches of moral excellence: for instance, if virtue be made to consist, as some moralists define it, in doing good to others, in benevolent endeavours to promote the welfare of mankind, those important classes of duty which respect piety towards God, and the regulations of our own desires and affections, are completely left out of view; and we have no doubt that this deficiency has in a vast variety of instances tended to weaken the sense of their obligation, to make them but little thought of, or if thought of, viewed as not essential to human virtue. When the will of God is made the rule of duty, there can be no such deficiency. His will cannot but respect all our actions, desires, affections, and dispositions. The laws of God, (by which we particularly understand the revealed declarations of his will,) clearly extend to all these; and attentive observance of the course of providence, of the dictates of conscience, and of the frame of man, while they aid us in the application of the divine commands, do also serve to shew his will in a degree, and with a force, proportioned to the extent and accuracy of our observations; and even if there be any cases

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cases in which the laws of God fail of application, yet from these sources the mind sincerely desirous of knowing and doing the will of God can seldom be at a loss to discover what it really is.

(3) The will of God considered as a rule of duty is an *invariable* principle. As far as we are left to ascertain the will of God from inferior and subordinate rules, this rule must, in some measure, partake of their uncertainty: but with the laws of God to aid and guide us, to prevent confined experience and an erroneous conscience from misleading us, it is extremely seldom that there can be any difference of opinion as to duty, where the will of God is honestly employed as the standard. If utility be made the criterion of virtue, or rule of duty, greater or less degrees of experience, greater or less freedom from the perverting influence of selfish feelings, will lead to widely different conclusions, if not with respect to the justness of the grand principles of duty, at least with respect to the extent and application of them. If the dictates of conscience (unless it be trained by the very rule of which we are speaking) be fixed upon as the guide of duty, we shall find them varying in extent, in correctness, and in power, through the influence of fashion, of prejudice, of ignorance, of prevalent opinions, and examples. But he who sets out with the will of God as his rule of duty, has a fixed principle which will not bend to the reasonings of the philosopher, to the opinions of the multitude, or to the promptings of passion. If, indeed, we do not seek for that as a *primary* principle of duty, we may sometimes be led to suppose that conduct to be directed by the will of God which is really inconsistent with it: but the more we seek for the guidance of that principle, humbly, sincerely, and earnestly, the more we shall find it; and the more we find it, the more firm, steady, and invariable, must our views of duty become, for the will of God itself must be invariable. And here we would observe

(4) That by taking the will of God as our rule of duty, our ideas of duty gradually become clear and comprehensive, and this to a degree which cannot be generally, at least, expected, where we rest in any subordinate rules. Voluntary obedience to the will of God has an exalting and expanding influence on the mind. If our individual welfare be regarded as the foundation of duty, in so far as we make it our rule, our views would be confined to our own little sphere, we should judge of actions and dispositions only, or principally, in the relation they bear to personal happiness; and, leaving out of view the intricacies and perplexities in which we should be continually involved, our notions of duty (unless still guided by the rules of revelation) would be as narrow and contracted as the principle on which they are founded. The same thing may be observed, though to a less extent, as to rules of duty founded upon utility and conscience, unless still further guided by the rules of revelation: so far from expanding as we proceed, our views would usually become limited by difficulties and objections, which, in the commencement of our moral investigations, we had overlooked. But fix upon the will of God as the rule of duty, with an impressive conviction upon the mind that his will must be right and good, we see more and more clearly the tendency of obedience to promote the welfare of his rational creatures: one moral truth serves as the basis for another: as we advance difficulties lessen: we see things more as they would be viewed by us if we could take the whole into account and forget their relation to ourselves: and we learn to view duty in its whole extent, where other rules would leave deficiencies; we learn to view actions and dispositions

without that undue reference to their *immediate* consequences, to which the subordinate rules of duty must too generally confine us. From this we are led to observe

(5) That the will of God, considered as a rule of duty, is in an eminent degree a *safe* guide. Several eminent moralists have made general expediency the criterion of virtue; and the author of Political Justice, (whose moral speculations, though in some cases interesting and valuable, often shew the folly of leaving the will of God as our chief guide,) maintains, that morality "is nothing but a calculation of consequences, and an adoption of that mode of conduct, which, upon the most comprehensive view, appears to be attended with a balance of general pleasure and happiness." But it is plain that beings who cannot see the consequences of any action in their whole extent and connections cannot be adequate judges of general expediency: and that if they take this as more than a subordinate rule of duty they must be continually misled by their ignorance and selfish prejudices. The true plan undoubtedly is, to ascertain, as far as we can, what is our duty, taking the will of God as our rule and guide; and then to pursue it without thinking too much on the particular consequences of our observance of it. "The happiness of the world," as bishop Butler admirably remarks, "is the concern of Him who is the lord and proprietor of it; nor do we know what we are about when we endeavour to promote the good of mankind in any way but those which he has directed." Even benevolence will sometimes do harm, unless it is under the guidance of religious principle.

(6) The will of God is a rule which carries with it its own obligation. We may indeed be told, that we have ourselves admitted that there is one ground of obligation beyond it, which is brought into view by that definition of virtue, which makes it consist in its tendency to promote the ultimate happiness of the agent; and it is to be allowed, that we may ask with reverence, Why should we obey the will of God? But the answer is plain and obvious:—Because, under the government of an infinitely wise, good, and powerful being, obedience to his will must secure our greatest welfare. When once asked, it is a question which never need be asked again. Its answer is a self-evident and necessary truth. We may say, therefore, that this rule carries its own authority along with it. We cannot think of any *higher* obligation than the command of that gracious Being, under whose government we live, and upon whom we depend now and for ever. We have nothing to do but to know what his will is, and then obey, with full security that we are doing what is wise and right; what, in fact, is best for others and for ourselves. And we must again observe, that if we make the tendency of our actions, &c. to our own ultimate happiness the criterion of virtue, we have no more sure and general guide as to that tendency than the will of him, upon whom our ultimate happiness depends; so that take whatever view of it we will, we come to the same conclusion.

(7) It is impossible for any one, who regards the scriptures as the authentic records of divine revelation, to hesitate in admitting that the principle of religious obedience is the foundation of duty; and that we cannot fulfil our duty, without making the will of God our rule of life. The express declarations of the scriptures, the examples they present to our imitation, and the views they unfold as to the relations in which we stand to God, all point to this truth. This to the Christian must be decisive; and to him, and to every one who agrees in the foregoing views of human nature, it must appear an important consideration in favour of the same position.

(8) That

(8) That the employment of the will of God as our *rule* of duty, must almost necessarily lead us to make the will of God our  *motive*, as well as our guide. It is indeed a supposable case, that a person should habitually employ this exalted rule, only from its being the best for him, as the best guide to his highest interests; but such is the constitution of the human mind, that it is scarcely a possible case. We are so formed, that what we pursue as a means will gradually become our end. In whatever way we learn the will of God, whether by the course of his providence, by our consciences, by the frame of man, or, above all, by revelation, if we steadily employ it as our rule and guide, (although in the first instance, because it is our wisdom to do so, because thus we shall best promote our own welfare,) it must, as we proceed, be continually obeyed, without any explicit reference to its consequences to ourselves; and in proportion to the frequency and consistency of voluntary obedience to the will of God, it will of itself become our ultimate object. Besides, if we take the will of God as the guide of duty, it cannot fail to teach us, (what other rules too often leave out of sight,) that it is our duty to cultivate the disposition to obey him, to seek for his approbation, to shun his displeasure, to fear him, to love him, to trust in him, and to serve him; and we cannot therefore doubt, both from the natural tendencies of the mind, and from those views of duty which the will of God communicates, that if we do make it our guide, we shall necessarily be led to make it our motive. Habitual, universal, voluntary, intentional obedience to the will of God, must be the highest point of excellence among all his rational creatures. This motive must carry along with it worth and happiness, security and peace, in proportion to the steadiness and extent of its influence. This the frame of man, and the course of providence, and the light of revelation, most expressly and forcibly teach us. In proportion as the will of God becomes our motive, shall we see clearly, and discharge steadily, the whole of our duty: in that proportion shall we become like him, whose grand end and aim was to promote the glory of the great Being who sent him, and to finish his work: in that proportion shall we become partakers of the divine nature, and the will of God become our will.

We should here be disposed to enter expressly into the consideration of the means we have of knowing the will of God; but some remarks, closely bearing on this point, will find a place in the next division of this article; and others, respecting social duty, have already been stated in the 13th section of the preceding division.

IV. We now proceed to our last division, in which we proposed to offer some conclusions from the preceding divisions, which may give some assistance in forming a basis of practical morality.

If our limits of time and space permitted, we had proposed to make this division more extensive than we now find practicable, and to introduce some considerations respecting the several branches of virtue, which come under the denomination of justice. We must now confine ourselves to the following objects: 1. The duty of candour. 2. Remarks on a theory respecting the confined charities, in Godwin's Political Justice. 3. On the extent of the obligation of truth, including some principles applicable to other cases, in which the dictates of duty are not clear.

I. *On the Duty of Candour.*—"The word *justice*," says Mr. Stewart in his *Outlines*, p. 234, "in its most extensive signification, denotes that disposition which leads us, in cases where our own temper, or passions, or interest, are concerned, to determine and to act, without being biassed by partial considerations. In order to free our minds from the

influence of these, experience teaches us either to recollect the judgments we have formerly passed, in similar circumstances, on the conduct of others; or to state cases to ourselves in which we, and all our personal concerns, are entirely left out of the question."—"Justice operates, first, in restraining the partialities of the temper and of the passions; and, secondly, in restraining the partialities of selfishness, where a competition takes place between our interests and those of other men. These two modifications of justice may be distinguished from each other, by calling the first *candour*, the second *integrity* or *honesty*." Mr. Stewart's remarks on the subject of candour are peculiarly judicious and important; and we deem no apology necessary for laying them before our readers. "This disposition," he observes, "may be considered in three points of view: as it is displayed, 1, in judging of the talents of others; 2, in judging of their intentions; 3, in controversy.

"The difficulty of estimating candidly the talents of other men, arises, in a great measure, from the tendency of emulation to degenerate into envy. Notwithstanding the reality of the theoretical distinction between these dispositions of mind, it is certain that in practice nothing is more arduous than to realize it completely; and to check that self-partiality, which, while it leads us to dwell on our own personal advantages, and to magnify them in our own estimation, prevents us either from attending sufficiently to the merits of others, or from viewing them in the most favourable light. Of all this a good man will soon be satisfied from his own experience; and he will endeavour to guard against it as far as he is able, by judging of the pretensions of a rival, or even of an enemy, as he would have done if there had been no interference between his claims and theirs. In other words, he will endeavour to do justice to their merits, and to bring himself, if possible, to love and to honour that genius and ability which have eclipsed his own. Nor will he retire in disgust from the race, because he has been outstripped by others, but will redouble all his exertions in the service of mankind; recollecting that if nature has been more partial to others than to him in her intellectual gifts, she has left open to all the theatre of virtue; where the merits of individuals are determined, not by their actual attainments, but by the use and improvement they make of those advantages which their situation has afforded them.

(2) "Candour in judging of the intentions of others is a disposition of still greater importance." It is "highly probable that there is much less vice or criminal intention in the world, than is commonly imagined; and that the greater part of the disputes among mankind arise from mutual mistake, or misapprehension. Every man must recollect many instances in which his motives have been grossly misapprehended by the world; and it is reasonable for him to allow, that the case may have been the same with other men. It is but an instance, then, of that justice we owe to others, to make the most candid allowances for their apparent deviations; and to give every action the most favourable construction it can possibly admit of. Such a temper, while it renders a man respectable and amiable in society, contributes, perhaps more than any other circumstance, to his private happiness.

(3) "Candour in controversy, implies a strong sense of justice united to a sincere and disinterested love of truth. It is a disposition of mind so difficult to preserve, and so rarely to be met with, that the most useful rule, perhaps, to be given with respect to it, is to avoid the occasion of dispute and opposition. A love of controversy indicates not only an overweening vanity, and a disregard for truth, but, in general, perhaps always, it indicates mediocrity of genius;

for it arises from those feelings of envy and jealousy which provoke little minds to depreciate the merit of useful discoveries. He who is conscious of his own inventive powers, and whose great object is to add to the stock of human knowledge, will reject unwillingly any plausible doctrines, till after the most severe examination; and will separate, with patience and temper, the truth they contain from the errors that are blended with them. No opinion can be more groundless, than that a captious and disputatious temper is a mark of acuteness. On the contrary, a sound and manly understanding is in no instance more strongly displayed, than in a quick perception of important truth, when imperfectly stated and blended with error;—a perception which may not be sufficient to satisfy the judgment completely at the time, or at least to enable it to obviate the difficulties of others; but which is sufficient to prevent it from a hasty rejection of the whole from the obvious defects of some of the parts.” “The effects of controversy on the temper, although abundantly sensible even in the solitude of the closet, are more peculiarly adverse to the discovery of truth in those disputes which occur in conversation; and which seldom answer any purpose, but to rivet the disputants more firmly in their errors. In consequence, indeed, of such disputes, the intellectual powers may be sharpened, and original hints may be suggested; but few instances are to be found, in which they do not mislead the disputants to a still greater distance from truth than before, and render their minds still more inaccessible to conviction.”

2. *Remarks on a Moral Principle in Godwin's Political Justice.*—Following Hartley, we formerly stated, as a good general rule of benevolence, that persons in the near relations of life, benefactors, &c. appear to have, in most cases, a prior claim to strangers. This rule will lead us to avoid all those opinions which attempt to found universal benevolence upon the ruin of the more confined charities. However specious they may appear, they must be false, because they counteract the moral improvement of man, by checking it at its origin. We particularly refer to those which Godwin has advanced in his work on Political Justice. His most general principle is, that every individual exertion should be so directed, as to produce the greatest possible sum of good to the species; and hence he infers that if we have the power to save the life, or increase the happiness of one or two human beings, we owe our exertions to him who is useful, and perhaps extensively useful to society, in preference to him who is an useless and perhaps injurious member of society. The claims of self are excluded by the general principle. “What magic,” says Godwin, “can there be in the word *my* which should change its operation?” Hence the claims of the confined charities ought not to oppose the deductions from the general principle. Hence it is not our business, in the direction of our benevolent exertions, to consider the relation in which the individual stands to us; but that in which he stands to society. Not is he my parent, relative, friend, or benefactor; but is he a worthy or a worthless member of society?

Godwin's errors are the more injurious, because they are apparently on the side of benevolence; they result from the inaccurate extension and application of principles which in themselves are indisputable. Whenever private interest interferes with the public good, private interest is to be sacrificed; and this, whether our own immediate good is the object, or the good of those who are intimately connected with us, by some of the natural bonds; that is, those which arise in the mind by the laws of our constitution. That the conduct dictated by the confined charities is to yield to what is really for the general good, cannot be disputed; but that

we are in all cases to act totally independently of a regard to those confined charities, is a position which will not bear the test of experience, nor of the mental constitution of man.

In the first place, general benevolence never could arise in the human soul but through the medium of the more limited affections. Love to others is founded on feelings originally personal, then it embraces the narrow circle of our immediate friends and acquaintance, and then, perhaps, there is little difficulty in extending it to those who bear with us the relation of children to the great parent of mankind. But before we can form the desire to do good to *all* men, we must have formed the desire to do good to *some* men; and though the desire of doing good to some, may be of that confined nature which would sometimes lead to the promotion of their aggrandizement and happiness, at the expense of those of others, yet the confined charities form too important a part in the great system, to be on this account rejected, as not being on the whole safe guides. We may lop off the excrescences, but it would be folly to destroy the root.

But, secondly, admit the formation of the affection of general benevolence independently of the private charities, it is obvious that without long culture and enlarged views, the general affection could acquire the vividness, which, by their frequent recurrence and particularity, the more confined affections can. Hence the removal of misery would be left to those who had thus cultivated the extensive affections, and consequently the means of removing it must be most materially diminished.

Thirdly: this principle would leave no rule for conduct upon which any one could act. If we are to be determined in our acts of benevolence, particularly in cases of immediate urgency, merely by the consideration of the utility of the individual to society, our lives would be a continual series of calculation, and, in general, of erroneous calculation. Who is there capable of accurately appreciating the worth of the individual? Our ideas are, in general, formed merely upon appearances which strike our attention, and force us to observe them. The silent efficacy of example, and private exertions to remove misery, and still more to remove or prevent vice, the parent of misery, are in general known only to him who seeth in secret. Even in cases where much is obvious, what diversity shall we find in opinion; and where the co-operation of individuals for the benefits of others is necessary, how improbable that they should have formed the same standard.

But admit that the cases are clear, that the person whom we are about to leave to death, (which is a supposition of Godwin's,) is obviously and decisively a less important member of society than he whom we attempt to save;—if we violate none of those feelings which rise up in the human frame altogether independently of the will of the individual, there can be no hesitation: but suppose that our intended conduct will violate them. Let it first be considered, that those feelings are not only necessary to the culture, nay, even to the formation of individual benevolence, but to the good order, perhaps to the very existence, of society. Take the strongest case; suppose the filial and parental affections to be annihilated, and it is absurd to justify and lay down as just, that conduct which, if not counteracted by the eternal laws of our frame, would lead to such annihilation, if that annihilation itself be not an object of desire; suppose these affections annihilated, and the heart shrinks from the picture. The claims of the helpless infant upon the parent would be rejected; and if enlarged views of duty to society did not induce the parent to think that he had better remove from existence a being who would be a burden to others and him-

self, and who probably would not be educated so as to be wise and happy, there would arise constant discouragements which would effectually prevent those steady, uniform, endeavours to cultivate the mental and moral powers, which are necessary to attain the object; and if the evil did not soon eradicate itself, man, if he existed, would gradually sink to the level of the brute. But if the parental affections did not exist, neither would those of the filial relation. Yet by these it is that the rudiments of general good-will are formed in the infant breast: with these it is that the being who is to love all mankind begins his career of love: these are the source of that ardent disinterested benevolence which carries the individual out of himself, which leads him to forget himself and all his immediate interests, and view only the good of others. Can it be supposed that this highly cultivated benevolence is in opposition to that more confined affection from which it sprung? We see it modifying its direction, but never annihilating it. On the contrary it may justly be affirmed, that the confined affections become more inwrought in the frame, as universal benevolence becomes more and more a feature of the mind: and it must, for universal benevolence is but only the sum total of all the confined affections, extended by the hand of piety. It is perhaps an invariable truth that we love *some* more in proportion as we love *all* more.

Wherever the claims of the confined affections are in direct opposition to the dictates of the enlightened conscience, there can be no room for doubt, though we ought to be careful that our departure from their claims not only is, but if possible, shall appear to be, demanded by these dictates; but even in cases which, independently considered, are obvious, we are to take into consideration the evil that will result from a breach of these affections. For this purpose we should consider what would be the consequence if our conduct became general: and next the tendency of human conduct to such extension. There are some affections which not all the efforts of philosophy could succeed in eradicating: vice may do it, and heedless levity; but the calm exertion arising from a view to utility never could. We refer to the parental affections. Hence though we might condemn the parent who left his son to perish in the flames, while he endeavoured to save the life of Fenelon, and should require strong proof that the parental affections existed in him, in their due force; yet we should doubly condemn the son who in such a case left his father to perish.

Godwin's principles, if carried to their full extent, would destroy society. We presume that the ardour of general benevolence misled him, and that in his wish to make its dictates paramount in the human breast, he forgot, or rather did not observe, that he was endeavouring to counteract the most essential laws of the human frame. It is one of those numerous instances in which an acquaintance with the human mind is necessary: had Godwin attended to its laws, it is reasonable to hope that he never would have given a theory to the world, which even a slight acquaintance with its practicability and effects should have consigned to oblivion.

*On the Obligation of Truth.*—We shall in this section offer some considerations on a subject of no small importance, and which has been the source of some very erroneous and injurious principles; we mean the restrictions which eminent moralists have admitted to the duty of truth.

A lie is a falsehood told with a design to deceive. Whatever be the motive leading to the employment of it, it is equally a lie. The moral culpability of the individual may be lessened or increased by the motive; but nothing more. We may call it by the mild appellations, *untruth, falsehood,*

*departure from truth, &c.*; but the nature of the thing is not altered. A falsehood told with the design to deceive is a lie. The expression a *departure from truth* does not appear invariably to imply any intention to deceive; a *breach of truth*, according to common usage, always does. *Veracity* expresses the disposition to adhere strictly to truth: it is uprightness in our words. A *departure from veracity* always implies an intention to deceive; and still more forcibly does a *breach of veracity*.

It is an important maxim in morals as well as in education, to call things by their right names. The odium of vice is often lessened by mild expressions respecting it. And, on the other hand, moral distinctions are often confounded, by giving to things, in themselves harmless, appellations which properly belong only to what is morally culpable. Fictitious narratives, *e. g.* are not lies: if the author pretend that they are founded on fact, or that they are true, when such is not the real state of the case, that assertion is a lie; but the narratives themselves are not lies. In like manner the exaggerations too common in conversation, and those falsehoods which solely arise from unfortunate mental habits, without any intention to deceive, and those expressions of complaisance which, though not true in their strictly literal sense, are so in the way in which they are almost universally interpreted, these ought not to be called lies. We do not say that they are altogether free from moral culpability; but it is not that of intentional deception. The exaggeration, or the expression of complaisance, may be intended to deceive; and then it becomes a lie; and in proportion as it verges to this point is its culpability. The culpability of the other departures from truth, (see *INTELLECTUAL Education*, col. 31.) depends upon the degree in which the individual has been negligent in his endeavours to check, or to correct, so injurious a habit: in itself considered it has no moral quality.

We have given the only definition of a lie which appears precise and intelligible; and it is accordant with the serious use of the term in common language. We fear that Paley has contributed to cause great incorrectness of expression, and even great laxity of principle, on this subject; and we are led to enter somewhat more fully into it from this circumstance. When we see that eminent writer expressing himself so loosely as to speak of those falsehoods which are not criminal as not being lies, and laying down as a maxim that falsehoods are not criminal, "where the person to whom we speak has no right to know the truth," we feel apprehensive of the consequences, and should rejoice to be able to correct his views by those principles of morality which our rule of duty appears to us decidedly to prescribe on the subject.

Paley does, indeed, qualify a little the random position we have quoted from him, by adding, "or, more properly, where little, or where no inconvenience results from the want of confidence in such cases," and his illustrations are cases of an extreme nature; but he still founds the obligation of truth upon a balance of known or supposed advantages, or even of conveniences; and his authoritative decisions on this point have, we doubt not, often led to departures from truth, where an unbiassed judgment must have shewn at once what was the way of duty.

This is a period of inquiry and speculation; and there are few who have opportunities of mental culture, who do not meet with discussions and difficulties, which the religious man of plain understanding might decide at once by an appeal to the scriptural rule of life, but which puzzle the reasoner who prefers some other basis of duty than the will of God, and still more mislead the consciences of those

who want justification or excuse for their own half-acknowledged violations of duty. And there are cases in common life, where those who are accustomed to think of the consequences of their actions, and rightly judge that they may thus often obtain important assistance in knowing the will of God, are apt to lay too much stress upon the *immediate* consequences, where their way would otherwise be clear. And the worst of all is, that these speculative difficulties, and these supposed excusable departures from a clear and acknowledged rule of duty, are continually leading to other departures which are obviously wrong; and this particularly among the young, and those whose views of duty are not yet settled, and their habits confirmed. The influence, too, of authority is great, especially where it accords with the previous dispositions, and with the present interests. And it is peculiarly injurious, where we look up with just respect to the moralist who sanctions such departures,—respect founded upon his eminent usefulness, and upon the general correctness of his principles, united with an interesting and convincing method of proof and illustration. And with respect to example, a lie is a definite thing: and the young and uninformed can usually judge as correctly as to the fact, as persons of the most cultivated understanding; while at the same time they cannot enter into the force of those nice discriminations and plausible reasonings, by which such persons bewilder themselves, and persuade themselves that they are excusable in violating an express rule of duty. It has often in such cases been, we doubt not, the inference,—“If another is excusable in lying, in order to prevent some mischief, or to produce some good, why may not I? and if this express law of God may be broken, when some good is to be obtained, or some evil to be shunned, why may not another?” The state of the matter is, that the *extreme* cases in which the obligation of truth has been supposed to cease, are of very rare occurrence; and if the exception were confined to them, it would be attended with no advantage to bring them forwards for public discussion: but when an exception is admitted to a rule of duty, unless it can so be well defined, as to form itself a rule, there is no knowing where to stop. The shades of distinction in cases of moral conduct are often so much blended, that it requires a very discerning eye to perceive their limits; and all know that when selfish feelings of ease, of pleasure, or of profit, are concerned, they never fail to throw a film over the eye of the understanding, and greatly obscure its power of discrimination. Those supposed exceptions to truth which are of an extreme nature, seldom fail to lead the speculative philosopher to others in which the way of duty seems to the Christian moralist perfectly clear: and these again at least furnish excuses, and sometimes imaginary justification, for departures from truth in which those who judge by the standard of revelation can see nothing but guilt.

It may perhaps make our way clearer, if we come to the more direct consideration of the cases of real or supposed difficulty, and attend a little to some fundamental positions which should have great influence in all our inquiries respecting duty.

(1) General rules of duty are absolutely necessary for the moral welfare of man; and, therefore, whatever tends to weaken the influence of any such rule, is in itself considered an evil. To perceive the necessity of general rules of duty in the present condition of human nature, it is simply requisite to consider what would be the state of things without them. We should then be under the necessity of calculating in every case that comes before us, on which side the good or evil attending the proposed action preponderates.

In fact, our lives must then be a series of mere calculation, and the active employments of life must be interrupted or altogether neglected. We should be obliged to decide, in numerous cases of continual occurrence, without possessing the means of judging as to the consequences of our actions. The great mass of mankind would be left without any guide. All would be left under the influence of emotion, prejudice, and self-love; and no consistency or regularity could be expected in the moral conduct of men. We are not unfrequently unable to trace completely even those consequences of actions which are immediate and apparent; still less those which gradually arise in the silent lapse of time. The consequences of actions may last, when the agents have long finished the journey of life. Our actions may influence others: our deviations may directly or indirectly produce more extensive deviations, of which we shall have, and can have, no knowledge. Perhaps there is scarcely an important action of our lives, the consequences of which are confined to ourselves, or even to our own sphere of observation. Besides, if we were unable to lay down general rules for moral conduct, and were obliged to decide upon each action as it occurred, it is scarcely possible that we should avoid the influence of heated feeling; and we should seldom possess that abstraction of mind, which would enable us to leave the present out of consideration, and view with calmness and impartiality the real tendencies of our actions. The cases are innumerable in which interest or passion paints in vivid colours the course to which they prompt; and throw into the back ground, and render almost imperceptible the dangers which should induce us with steady firmness and perseverance to avoid it. From these considerations taken together, it may be regarded as indispensably necessary, that there should be general rules for directing the moral conduct; and from this it immediately follows, that every deviation from a general rule of duty must, in itself considered, be an evil.

(2) In considering the consequences of departing from a rule of duty, we must not confine ourselves to the *immediate* consequences; but must also take into account the ill effects arising from the limitation of the rule itself, the tendency of one limitation to furnish ground for another, the tendency of one departure from the rule to lead on to another, to weaken its authority in our own minds, and to weaken its authority in the minds of others, and so on.

(3) *Expediency* must always give way to *right*. *Expediency* particularly refers to the temporal consequences of actions, especially to those which actually come within the sphere of our own observation; and, of course, our views of it must depend upon the comprehension of our minds, and upon the extent of our experience and observation. *Right* takes the whole into consideration, and rests most on established principles of duty, particularly those derived from the divine law. As soon as a person has by any means satisfied his mind respecting the will of God, in any particular case, he then knows what is right for him. *Expediency* is peculiarly the subject of prudence; *right*, of duty. Though it is often the part of duty as well as of prudence to do that which is most expedient; yet where expediency appears to oppose a clear rule of duty, we ought not to hesitate in our choice. The right, pursued aright, must always prove, under the government of wisdom and benevolence, the most expedient.

(4) Where the rules of duty are not only agreeable to the dictates of conscience, and to those conclusions which are drawn from an extensive consideration of the external and internal consequences of actions, of the frame of man and the course of Providence; but are also sanctioned by the

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the express authority of revelation, they ought not to be violated, except in cases of absolute necessity; that is, where, after a serious deliberate examination, they appear to us to interfere in their direction. In such cases, (which, however, are very rare, even in our present state of knowledge as to duty, and which in all probability will hereafter altogether disappear,) we must, to the best of our abilities, balance the importance of their directions, and decide by the result. According to the old maxim, we must, of two evils, choose the least.

(5) If ever the rules of duty appear to interfere in their directions, we must be considerably guided by the comparative importance of the rules themselves. In forming the comparison, we must take into account, not merely the consequences of the particular case, but also the strength and universality of their obligation; the consequences which would follow from their being generally neglected, and the common tendency to such neglect; and also the nature of the consequences, whether they affect the religious and moral welfare of ourselves and others, or respect temporal interests merely; and again, we must consider whether the rules are clear and definite, or whether they are by their nature indeterminate; because, where they are clear and definite, the violation of them is obvious and certain; where they are indeterminate, the violation of them may be in appearance only; and the consequent ill effects on the minds of others, will usually be less in the latter case than in the former. Some may perhaps think, that if all these calculations are to be made in cases of duty, the way of duty must be indeed difficult and perplexed. The fact is, we are speaking of cases which, if the mind be under the guidance of religion, are of rare occurrence. An humble devout heart is the best preparation for knowing our duty. The wisest among the sages of antiquity has well said, "trust in the Lord with all thy heart, and lean not to thine own understanding; in all thy ways acknowledge him, and he shall direct thy paths."

(6) It appears to us a clear and important moral principle, (founded, in a great measure, on the foregoing considerations,) that the violation of any rule of duty is wrong unless it is right; that is, unless it be required by some other rule, which, in the particular case at least, requires the preference as more urgent and important. For instance, obedience to parents is a clear and positive duty; and where no higher duty interferes, disobedience cannot but be wrong; but it may happen that a parent commands what is forbidden by the laws of God; and it then is not only right to disobey, but it would be wrong to obey. With respect to the rules of duty, there is, we apprehend, no middle course. If no higher rule interferes with the operation of that which respects our own case, it is our duty to obey it; if a higher rule does interfere with it, it is our duty to neglect it. In every case of moral conduct, there is but one right course; every other must be wrong. Not that all the rules of duty are of equal importance; still less that there are no degrees of right and wrong, as far as respects the motives; but that our actions, to have any moral character at all, must either be right or wrong. There is no neutrality in duty.

We have not referred to the motives leading to any departure from a rule of duty, because our concern is not here with the criminality of the agent, but merely with the character of the action; and, indeed, it belongs not to any human being to apportion to each his place in the scale of moral worth. He only who knows the secrets of the heart, can know, with certainty, in any case of departure from duty, whether it arose from blameless ignorance, from a

mistaken desire to do right, from benevolent feelings, or from weakness and timidity, from the promptings of interest, from directly criminal dispositions. Where actions are right, we should not readily admit suppositions tending to lower the worth of them; where they are in themselves indifferent, we should be cautious in assigning wrong motives to them; and even when wrong, we ought readily to admit and suggest what will palliate the culpability of the offender; but we should never allow ourselves, through the feelings of candour, to confound the distinctions between right and wrong; and, without pretending to ascertain the merit or demerit of the agent, it is often necessary to decide respecting the rectitude or immorality of his conduct, both with a view to our own guidance, and as a direction and warning to those around us. Ignorance is an excuse for departures from duty, only where it is unavoidable. If it arise from the want of a sincere desire to seek and find the true path, or from an indisposition to see the truth, because the truth will probably condemn; ignorance partakes of the criminality of those sources of it, and is responsible for its consequences. And the true way to acquire stability and consistency of conduct, is to enlighten the conscience beforehand, to form judicious steady principles of action, and to submit to their guidance without allowing the immediate consequences to enter much into our calculations. Such a principle, we are satisfied, is what we have already stated; that the violation of any rule of duty is wrong, unless in the circumstances of the case it is required, by some more immediately urgent and higher rule; that is, unless in those circumstances it is right.

The application of the foregoing moral principles to the difficulties of veracity, is sufficiently obvious; but a general view of it may abridge the particular consideration of them. There may be cases in which benevolence seems to lead to a violation of truth. It is our duty to do good as we have opportunity, and therefore, the casuist may say, since in this particular case, the good to which benevolence points is great and important, the necessity urgent, and the ill consequences of a breach of truth are slight, here benevolence ought to suspend the obligation of truth, and here *falsehood is a duty*. The genuine feelings of uprightness and sincerity can scarcely bear such a combination of terms; and yet falsehood cannot be otherwise than wrong, unless it be absolutely right. But let us not decide by mere feeling, lest when the desire of self-justification turns the scale, principle should be forgotten. The falsehood must be an evil, as a violation of a positive rule of duty, expressly enjoined, and strongly sanctioned by the revealed will of God. It must be an evil, because that rule is of the utmost consequence to the temporal and spiritual welfare of mankind; for words are the grand medium of all the influence we have over the happiness of others, and mutual confidence is necessary to this influence, not only in cases of present interest, but in those which are most closely connected with our eternal well being. It must be an evil, because that rule is clear and intelligible; admitting of but one meaning, and that perfectly precise and definite; because the rule is universal in its application, in no case made to depend upon consequences, but absolute in its injunctions, and in no case inconsistent with itself; because the rule is upheld by the authority of the conscience, where this is enlightened by Christianity, and cannot be slighted without neglecting its dictates; because the rule is so strict, precise, and extensive, that scarcely any exception can be imagined, which, if allowed to be right, will not justify others; and these justify or palliate others, and so on, thereby weakening its authority and its value, and making way for those baneful effects

which

## PHILOSOPHY.

which necessarily arise from the common neglect of it, in proportion to that neglect; because the obligation of this rule is superior to that of the other rules of social duty, inasmuch as they require truth, and therefore it has their obligation to support it; and at the same time it has an obligation of its own. In most cases benevolence clearly enjoins a strict adherence to truth, and in like manner does justice; and justice never sets any limit to its obligation; this of itself would make truth a duty; but besides this, its authority rests on the strong declarations of the conscience, and upon the more steady unvarying declarations of the law of God, and therefore, upon its powerful and all-important functions.

Against all this, he who is determined to adhere to duty cannot, with any consistency, place any selfish interests;—no one at least can suppose that the greatest worldly interests can *outweigh* the obligation. But the limits which appear sometimes to be set to it by benevolence, have cost many a perplexity and many a struggle; and too probably many a departure from truth, and we doubt not many a bitter pang of remorse when the mind ceased to be guided by the impulse of feeling, and when the conscience has become enlightened by a steady principle of religious duty: for though we cannot but suppose that he who knoweth our frame will make every allowance for our wanderings from the narrow path of duty which not selfish anxiety, but real, though not enlightened, benevolence has produced, yet piety, whenever it gains its full sway in the heart, will make it feel its weakness, if not presumption, in supposing that the good of the creature might lawfully be sought by means which the all-wise Creator hath forbidden. The commands of God must be a better guide for promoting the welfare of mankind, than those affections which, though implanted by him to excite to promote it, are capable of a wrong direction, and clearly require the support and guidance of a higher principle. Benevolence, considered as a *rule* of duty, never can be inconsistent in its directions, because it requires us to do the *greatest* good in our power; and pious benevolence must always feel a confidence, that this will be best accomplished by a steady adherence to that course of duty which infinite wisdom and benevolence has prescribed: but benevolence, as it refers to our own *feelings*, is often inconsistent in its directions, and may mislead us;—it may dwell upon some supposed good or means of good, when some other ought in the eye of reason to be the end proposed;—it may be directed to one object, when, if our comprehension were enlarged, we should give the preference to another; and, (what is most to be apprehended,) where not completely placed under the direction of piety, it must often be subject to the capricious inconsistencies and partialities arising from self-love. Where, however, the heart is devoted to do good, and common prudence is employed in effecting it, we need not be afraid of following the dictates of the benevolent affections, unless they interfere for the time with some higher principles; nor should we be too scrupulous in our calculations, lest we lose means and opportunities which cannot be recovered; but wherever our feelings prompt us to sacrifice so important a principle of duty as truth, in order to do some supposed good, let benevolence represent that it is not immediate good, or temporal interests alone, which are to be taken into account, but future evils also, and the spiritual well-being of others and ourselves; and if even their conscience is undecided, let piety lay, whether in the departure from an acknowledged, strict, express, unlimited rule of duty, we can hope for the approbation of him who seeth the heart. One whose noble sacrifices to a sense of duty will ever endear his memory to all

who know and can appreciate their value, (we refer to the excellent Lindsey,) has well said, "God does not want our sinful acts;" and one whose authority must rank high with the Christian, has taught us not to do evil that good may come. Obedience to the will of God must in all cases be best for frail erring man.

We once more return to the same point, if any case can be pointed out in which, all things taken into account it is right, our duty, to depart from truth, then and then only can such a departure cease to be wrong, and contrary to duty. We can admit of no exception to a rule of duty, which we cannot make itself a rule of duty; and to so clear and definite a rule as that of truth, no exceptive rule can be admitted, which is not itself perfectly clear and definite.

The chief exceptions to the obligation of truth which have been admitted by different moralists, are, where falsehood is supposed to be important to the spiritual welfare of others,—in the conduct of wars,—in case of immediate danger to our life or the lives of others,—in intercourse with those who do not possess the use of reason, or who have not yet acquired it,—and in the sick chamber.

1] It is rather singular, that in what is, in some points of view, the strongest case, where the benefit to be gained, or the evil to be avoided, respects the spiritual welfare of others, it is almost universally allowed that no violation of truth is admissible. What were once termed *pious* frauds, are now pretty generally considered as *impious* frauds. It is a great and good end, to promote the moral well-being of a fellow creature,—to communicate to him those views and principles, which will preserve him from vice, and raise him in the scale of moral worth; and there can be no doubt that this is our duty as far as our influence extends; but we here see clearly that we are not to employ unlawful means to promote a lawful end, even though that end be important in the highest degree. It is true, increased experience and enlightenment give us now the means of perceiving, that, in reality, the evil surpasses the good; and that the good, if not in the individual case, yet, generally speaking, is best accomplished by employing only the weapons of truth,—is even greatly impeded by employing those of fraud and falsehood; but this could not be perceived when such departures from truth were practised by some of the Christian fathers, and even applauded by them. They had, however, the express rules of revelation to guide them, as we have; and the immorality of their conduct consisted, not in the intentions, and in the end proposed, but in setting up their weak judgments in opposition to the commands of God, and doing evil that good might come. We have referred to this case, not because any enlightened Christian can now hesitate in believing, that he is forbidden by duty to endeavour to promote the cause of Christian truth and practice by means which are inconsistent with that simplicity and sincerity which the Gospel requires; but because such means were once, by great and good men who were heartily devoted to that cause, considered as allowable and even justifiable,—that we now see that they were wrong,—and that this should teach us great caution in admitting of any specious exception, since the best ends will not sanction bad means. It should be an invariable principle, that unless duty *requires* the violation of truth, duty forbids it.

2] With respect to the falsehoods employed in the conduct of war, we have but little to say. War is in all cases an evil. It may sometimes be a necessary evil; but in all it is a great one; and in no view greater than as fostering the evil passions, and cultivating the vices of men. In many circumstances, deceit in actions is a part of the system of warfare;

warfare; and if war itself be ever justifiable, we suppose that stratagems in the conduct of it, not involving any breach of faith, must also be so. But there is a clear and well-defined distinction between such stratagems and lying; and the horrors of war would be greatly increased and prolonged if falsehoods also were employed to deceive. Besides, it would also deserve consideration, if the question were not already decided by a general sense of expediency, that the employment of falsehoods, while in a state of warfare, would not be confined to it. The soldier would not make those nice distinctions which the general might have endeavoured to make, to satisfy himself that he was not doing wrong; and thus his regard to truth would be weakened. And it may farther be remarked, that the violations of duty practised by those whose general conduct from any circumstances excites our admiration, whether observed by ourselves, or read of in the pages of history, have a great and direct tendency to confound moral distinctions in our own minds, to weaken our abhorrence of what is wrong, and to lead to the practice of it. It is not possible for any man to know, when he departs from duty, when the ill consequences stop.

3] Cases have occurred where a person has preserved his life by a breach of truth. In such cases we must leave the culpability of the individual to the decisions of him who alone can fully appreciate the moral worth of actions; our examination merely concerns his conduct. If it be right to preserve life by falsehood, it must be wrong to forfeit it by adherence to truth; and yet, we conceive, there are few who would not cordially approve and admire the conduct of him who, in such circumstances, followed truth at the certain risk of his life. As far as his conduct is known, it necessarily tends to produce a steady love of duty, a decided attachment to principle; as far as the conduct of the other is known and regarded as justifiable, it tends to weaken the sense of the obligation of a virtue, which is of the first importance to the well-being of society.

We confine ourselves to the case of simple falsehood to preserve life. If, farther, there be a desertion of some important principle, there are few who can hesitate. The disciple of him who came to bear witness to the truth, and who bore it in the midst of suffering and of death, cannot but regard it as the indispensable duty of every one, who believes he possesses Christian truth, to stand by it at any risk. It was by this noble determination in the breasts of the early confessors and martyrs, that Christianity made its way in the world: it was by the same noble determination in the minds of the first reformers and their followers, that Christianity has been freed from its grossest corruptions. But if, in such cases, we perceive at once that truth is not to be violated, it is only because we see the good consequences of adherence to it in a more obvious and striking light. The present evil is the same as in the case where there is no further desertion of principle, than what is implied in the simple desertion of truth; and the folly and baseness of it in the one case, should make us feel great hesitation in supposing it to be right in the other; and if it be not right, we must pronounce it wrong.

But let us try to trace the consequences a little. Suppose a person in such a dreadful situation, that a lie appears to be the only means to save his life. If he have been habitually accustomed to regard a lie with abhorrence, it is extremely improbable that he will be able to tell one in such circumstances, with that firmness and freedom from embarrassment, which will make it effectual. But allow that he has the requisite presence of mind, (which by the way would usually enable him to obtain the end without false-

hood,) what are the effects of such violation of truth on the murderer, on himself, and on others. The highway-robber, for instance, would take for granted, that if one man may justly lie to save his life, another will feel at liberty to do the same to save his money; and though, in the particular instance, confidence has been obtained, yet in proportion as this exception to truth is admitted as right, so will that confidence be destroyed in other cases, which is often so necessary to the preservation of life. There can be no doubt, that if there were not that general degree of confidence, life would often be taken away by the depredators on society, where now they are contented with simple robbery. Thus the probable effect of lying to save life would, perhaps, universally be, to make even truth unavailing to save it. But farther, very few instances occur in which the successful lie does not weaken the individual's general respect for truth: but supposing that this ill consequence does not follow, and that the individual, being under the influence of a strict regard for truth, has merely departed from it in this extreme case, because in this extreme case, and this alone, he thought it justifiable,—can the limit, which is thus broken down from the laws of duty, be removed to any place a man may choose? If one may justly lie to save his life, why may not another to save that which he values more than life, his reputation? why may not a third lie to save that on which the comfort of life depends? Indeed, when once we allow exceptions to the rules of duty, which are not rendered necessary, (in other words right,) by the obligation of some higher duty, there is no knowing where to stop. The property, which to one may appear as valuable as his life, and for which he thinks that he may justly violate truth, may be a mere trifle to another: but if one may lie to prevent the loss of a thousand pounds, why may not another? and if for a thousand, why not, in corresponding cases, for a hundred? and so on: if one may justly lie to preserve his reputation, or any other possession which he values, or thinks he values, as much as his life, why should another be culpable who does the same to acquire it?—Instances continually occur, in which men risk their lives to defend their property, or even a comparatively small portion of their property; and yet some suppose that it is justifiable to avoid such risk, where truth must for this purpose be violated. If it be, then truth is not to be regarded as of the same value as money. But, indeed, there is no end to the difficulties and inconsistencies in which we must be involved in this and every other case of moral conduct, by departing from the plain straight forward path of duty. If any one should be exposed to a trial so severe as what we have been considering, let him call to mind, that there is something more valuable than life and every external means of comfort,—the approbation of our own hearts, and the present and final approbation of Him, who is greater than the heart: let him call to mind, that there is something more terrible than death, the anguish of a wounded spirit, and that which alone need render death terrible, the consequences which are to follow it.

It may indeed be said, that no one but he who has a conscience in some good measure void of offence, could be without that dread which would prevent him from adhering to the strict line of duty at a risk involving not only life, but interests of infinitely more importance. We allow it: but our consideration here is, what is the strict line of duty in such a case; and what course a man of uprightness, veracity, and fortitude, ought to pursue, and would pursue, under the strong influence of religious principle and regard to the dictates of conscience; and we suppose, that he would in such a case think he had nothing to do but to do his

his duty, and humbly leave his own interests, and the interests of those whom he held most dear, in the hands of a gracious and all-wise Providence.

4] With respect to education, we feel confident that the strictest truth and sincerity ought to be employed on every ground, not merely of duty but even of expediency. Children are, at a very early age, aware of deception; and at this point of the mental progress, the seeds of truth or falsehood are to be sown. Implicit confidence in the word of a parent, is of the utmost consequence to give that influence, and to produce that obedience, which can never follow from parental authority alone; and he who departs from truth in his intercourse with his child, will some time or other have cause to lament his weakness and his folly. The habit of truth cannot be begun too early; nor is there any effectual method of producing it as a permanent, consistent, actuating principle, but by strongly impressing the mind with an abhorrence of falsehood, by making its ill consequences perceived and felt, and by calling in (on suitable occasions, and in proper degrees) the authority of the divine commandments and the aid of religious principle in general: and all this cannot possibly be done with success, if truth do not strictly regulate the words of those by whose instruction, and discipline, and example, the principles of moral conduct are to be formed or cultivated. The truth need not always be told to a child; and by proper care and early repressing a more prying curiosity, and especially by acquiring their confidence, we may make our children not only submissive, but *satisfied* without knowing every thing that we know: but falsehood they should never be told. See *MORAL Education*, III. 13.

It really ought to make us extremely suspicious of every supposed restriction to the duty of truth, to recollect, that once it was thought *right* to lie in order to promote the spiritual welfare of others; and that, even till very lately, it has been represented by Christian moralists as at least allowable in our intercourse with children. In the former case the folly of such conduct is now universally admitted; and, in the latter, we trust that religious parents, at least, see more and more what wisdom and duty alike require from them. The heathen poet has given them a noble maxim, "The greatest reverence is due to a child;" teaching us, that in no case should we do or say in the presence of children, what will tend to weaken their sense of duty and disposition to practise it: and shall it be supposed, that those who are enjoined to bring up their children in religious obedience, can be justified in looser principles of morality?

5] After what has been advanced, especially in reference to the general principle, we think it cannot be necessary to say much on a case of common occurrence, but in most instances of very easy decision; we mean, in our intercourse with the sick. If, in such circumstances, the immediate advantage to be gained appear to require a breach of truth, we should call to recollection that it cannot be obtained but by the violation of a strict, and most important rule of duty; and if, after this, we cannot rest satisfied without considering consequences, let it be taken into account that, in the particular instance, every such departure from truth must, as far as it is discovered, which it commonly is, directly tend to weaken that confidence which is peculiarly necessary to preserve the mind calm and tranquil, and in its place introduce a harassing and injurious suspicion; and also to weaken confidence in the other exercises of the domestic relations; that it contributes greatly, and almost inevitably, and far beyond usual estimation, to lessen the regard to truth in those around us; that there can be no restriction to such departures, and that in proportion as they become frequent,

they must defeat their own purpose, and at any rate must often make truth unavailing where it is of the utmost consequence for peace of mind, and even for the continuance of life.

We cannot possibly see the whole result of our actions; and without perplexing ourselves too much with the difficulties of particular cases, it is best to go on, without the wavering of uncertainty, satisfied that all we have to do, is to exercise ourselves to that prudence and self-control which will make the consequences of truth as little injurious as possible. If there are any extreme cases of the above description, where a departure from it becomes our *duty*, it must be included in the class which we are about to consider.

We have proceeded thus far, not without difficulty, but with satisfaction. We have not been without the apprehension that we should appear to strain the principles of duty too far; and are well aware that if we really did so, we should do injury, rather than service to its cause. We can only say that we have allowed this apprehension its full influence. We have examined the subject at different intervals, and with various degrees of experience; and our ideas remain radically unchanged, and our conviction in the justness of them in several instances more satisfactory. With respect to the cases of most constant occurrence, we have no difficulty remaining; with respect to the extreme case (stated in No. 3,) there it appears to us that every selfish interest is to be given up; but it is only because we deem this an inevitable consequence from principles which appear to us indisputably true. If any bias has existed respecting it, it has been what we have above stated. If we saw reason to think it right, we should willingly give it up, as being, in appearance, little calculated for actual practice. But we see no line which can be drawn to exclude it from the general obligation; which will not, at the same time, exclude thousands of instances in the daily occurrences of life, where, nevertheless, no doubt can exist in the mind of any one whose conscience is at all guided by our rule of duty. We are farther satisfied that the admission of the exception would, in almost all instances, defeat its own purposes; and we know that it is a principle of Christianity that our present interests are never to be placed in competition with our duty; and we see that benevolence requires this as well as religion.

6] After deliberate re-examination, however, of our own difficulties, in those cases where a departure from truth may be necessary for the present welfare of others, we think we perceive a rule which may guide us, so as to suit the actual condition of human nature, without leading us too far. When considering it for their own satisfaction, we entreat our readers to apply our principles. If these exclude it, let the cases it includes remain among the difficulties of duty which we have at present no means of satisfactorily removing. Feeling ourselves the force of the observations stated in different parts of this section, it is with much hesitation that we propose, as a restrictive rule, that wherever the evil attending a strict adherence to veracity affects *others*, and is otherwise *unavoidable*, and *absolutely irremediable* there, and, as it appears to us, there only, we should do *right* to depart from it. This limit *seems* to be required by benevolence in such cases as these; where, by departing from veracity, we could save the life of a person who, we had reason to believe, was in a state utterly unfit for death; or, of an excellent parent on whom a young and numerous offspring absolutely depended for support and for training up in the way of duty; or where, by such means, we could prevent an irretrievable injury to the moral purity of one whose chastity was yet unstained. And if it be really required by benevo-

lence in such cases as these, we know no restriction which will not include every case affecting others, where the evil is otherwise *unavoidable* and absolutely *irremediable*. We can scarcely to rejoice that such cases are extremely rare, and can scarcely occur more than once in the course of any one's experience; and they might therefore have been passed unnoticed, but that we are desirous fairly to meet the difficulties of the subject. And while proposing this restrictive rule, we do not forget that what, in his ignorance of futurity, a person might aim thus to promote, might eventually be injured by it. Any thing short of unavoidable and (especially) *irremediable* injury, our rule does not extend to. By a strict adherence to truth, I may subject a man to great loss or inconvenience; and it may be required by benevolence to do what I can to remedy it, by my exertions and sacrifices; and if I have increased the injury by a want of prudence or presence of mind, more may reasonably be expected from me; but it never can be required from me that I should do any thing really wrong for the benefit of another.

If after due consideration of the exceptive rule which we have here proposed, it should appear to be excluded by the general principles already laid down, we shall willingly relinquish it; and we cannot help supposing that the time will come, when, as in the case of the other supposed exceptions to truth, this will be seen to be by no means required by duty. At present the consequences appear to us, in this class of circumstances, to be of that nature, that the more urgent claims of benevolence, without any reference to personal considerations, require the suspension of the claims of truth, and that a departure from it is right. We wish it, however, to be well considered, that this exceptive rule tends, in the cases to which it is applicable, to defeat its own purposes, and to prevent the beneficial consequences of truth and confidence. And if, after all, it do appear to be a right one, we must repeat, that it can only be defined and limited, by extending it to those cases alone where the evil affecting others is otherwise unavoidable and absolutely irremediable.

7] As to the case of intercourse with those who labour under mental derangement, we have not sufficient knowledge of circumstances to speak with confidence. We are fully aware that such circumstances are of too extraordinary a nature to come within the common rules of duty; but we are inclined to believe that the injury done by violations of veracity in such cases, must, on the whole, be such as, in general, to exclude them, except in cases which come under the last head. And it is probable, that by skill and prudence, the necessity of all direct breaches of truth may, in all others, be prevented. It may sometimes be necessary to fall in with the train of ideas passing in the mind of the patient; but, with caution and good sense, it can seldom be even apparently necessary to go any farther.

If cases occur of the extreme kind, included under the sixth class, the individual who is influenced in them by a real regard to duty, will do his best to shew upon what principle he has proceeded,--to make it manifest that the supposed necessity was extremely painful to him,--and to prove by his conduct that he does in no way consider it as furnishing any reason for departures from the strict principles of veracity in cases of a less urgent nature, and where the evil was not absolutely irremediable.

In those cases of the 5th or 7th class where departures from strict truth appear unavoidable, it should be regarded as an indispensable duty, not to expose those to such situations whose moral principles are weak;--that, in particular, the young should be kept aloof from them;--that they should not be made the subject of conversation in

their presence;--and that, if mentioned, they should be represented as distressing to the moral feelings, and only practised because apparently unavoidable;--and the young should be convinced, by strict and invariable regard to truth in other cases, that this is the only motive. By such means, much of the evil arising from them may be prevented: but when they are not employed, (in cases, especially, of a domestic nature,) the evil is often greater than could possibly be produced by a strict observance of truth, under the guidance of firmness and discretion.

To conclude: we are fully aware, that to adhere steadily to this branch of duty, often requires considerable fortitude; and sometimes, to make truth really beneficial in the particular instance, much presence of mind: but it is not the only case in which these important qualities are requisite. Real fortitude is essentially necessary in almost every department of duty: and nothing contributes more to produce it, and at the same time to produce a proper degree of prudence and presence of mind, than having fixed principles of moral conduct, and proposing to ourselves nothing more than a single steady aim to discharge our duty,--nothing, we should say, except that which is itself of the first consequence to the means as well as to the end, an humble dependence upon Him who condescends to call himself our father, a constant regard to his will, and the desire of his approbation as our chief good.

PHILOSOPHY, *Natural*. See NATURAL.

PHILOSOPHY is also frequently used for the particular doctrine or system of opinions, broached by some considerable philosopher, and espoused and adhered to by his followers. In this sense we say,

PHILOSOPHY, *Arabian, Aristotelian, Cartesian, Epicurean, Hermetical, Leibnizian, Newtonian, Oriental, Platonic, and Socratic*. See PERIPATETIC, &c.

PHILOSOPHY is also used for a certain manner of philosophizing; or certain principles, upon which all the enquiries thereby made do turn. In this sense we say,

PHILOSOPHY, *Corpuscular or Atomical, Mechanical, and Experimental*. See the adjectives.

PHILOSOPHY, again, is considered with regard to the age, or the place, in which it was taught. In this sense we say,

PHILOSOPHY, *New*, &c. See MECHANICAL *Philosophy*.

PHILOSOPHY, *Scholastic, or School*. See SCHOLASTIC.

PHILOSTORGIUS, in *Biography*, an ecclesiastical historian of the fourth century, was born at a village in Cappadocia, about the year 368. When he was in his twentieth year he went to Constantinople, in order to acquire literary improvement under the most celebrated professor in that city. He wrote an "Ecclesiastical History," in twelve books, containing the history of affairs from the commencement of the Arian controversy, or about the year 300, to the year 425, when it was published. This work, which was written to vindicate the Arian hypothesis, was condemned and proscribed by the Catholic party, who were so active in suppressing it, that no entire copy of it has reached modern times. Large extracts from it are preserved in Photius' "Codex," which were published at Geneva by James Godfrey, accompanied with a Latin version, notes and long dissertations, in 1643. About thirty years after, the learned Henry de Valois having collated the original with different manuscripts corrected the text, and having given a new translation of the whole, published these extracts at Paris, together with the ecclesiastical histories of Eusebius, Sozomen, Theodoret, &c. in 3 vols. folio, followed by a supplement of additional fragments from Suidas and others. This edition was reprinted at Cambridge in 1720.

PHILOSTRATUS, FLAVIUS, a celebrated sophist,

was born either at Lemnos or Athens. He resided at Rome in the reign of Severus, and was employed by the empress Julia to compile a life of the famous philosopher Apollonius of Tyana. He wrote likewise a work entitled "Icones," being a collection of descriptions in a florid but pure and elegant style. His nephew, who flourished in the time of Hellogabalus, wrote the lives of the sophists. The best edition of the works of Philostratus is that of Leipsic, in 1709.

PHILOTERA, in *Ancient Geography*, a town in the vicinity of the Troglodytes, placed by Ortelius on the Cimnerian Bosphorus, in the environs of Caucasus.—Also, the name of a town placed by Polybius on the lake of Tiberias.

PHILOTHEUS, in *Biography*, a celebrated patriarch of Constantinople in the 14th century, was a native of Greece, who embraced the religious life in the monastery at Mount Sinai: he afterwards became abbot of the monks at Mount Athos, and before the year 1354, was made archbishop of Heraclea. In the following year, upon the deposition of Callistus from the patriarchate of Constantinople, he was raised to that dignity, which, however, he was obliged to quit to make room for Callistus, when he was restored to favour. Upon the death of that prelate, in 1356, the emperor John restored Philotheus to his former dignity, and ever afterwards treated him with distinguished favour. He retained the patriarchal chair till his death, which happened about the year 1371. He was author of a great number of works, enumerated by Fabricius, and he is spoken of by Cantacuzenus, as a person who was highly respected for the sanctity of his life, and for the eloquence with which he was gifted.

PHILOXENUS, a dithyrambic poet of Cythera, lived at the court of Dionysius of Syracuse, who banished him to the stone quarries for censuring his verses. He died at Ephesus about the year 380 B.C. He was the rival of the elder Timotheus and of Polyides, dithyrambic poets of great reputation. His innovations in music are stigmatized by Plutarch.

PHILOXERUS, in *Botany*, from *ελεος*, a lover, or friend, and *ερεος*, dry, or burnt up; alluding to its native climate, and favourite places of growth. Brown Prodr. Nov. Holl. v. 1. 416. Class and order, *Pentandria Monogynia*. Nat. Ord. *Holeraceæ*, Linn. *Amaranthaceæ*, Brown.

Ess. Ch. Calyx in five deep segments. Corolla none. Stamens five, combined at the base into a small entire cup, shorter than the germen. Anthers of one cell. Stigmas two. Capsule membranous, single-seeded, without valves.

Obs. This genus is next akin to *Gomphrena*, and, according to Mr. Brown, differs from *Lithophila* only in the number of *stamens*, and the equal *perianth*; see those articles.

The name is well contrived to keep in view its analogy with the latter genus, whose reputed natural order, as well as its generic description, given by Swartz, require correction. The species of *Philoxerus* have opposite leaves; short dense terminal spikes; and three bractees to each flower. We presume the latter have been taken in *Lithophila* for a calyx, and the true perianth for a corolla.

1. Ph. *conicus*. Br. n. 1.—Spikes conical; ternate or solitary. Calyx woolly. Leaves linear, revolute. Stem erect.—Found by Mr. Brown, in the tropical part of New Holland.

2. Ph. *diffusus*. Br. n. 2.—Spikes stalked, solitary. Calyx very smooth. Leaves lanceolate, downy on both sides. Stem prostrate, woolly.

3. Ph. *vermiculatus*. (*Miscebrum vermiculatum*; Linn. Sp. Pl. 300. *Gomphrena vermicularis*; Swartz. Obs. 101.

Willd. Sp. Pl. v. 1. 1322. *Amaranthoides humile curassavicum*, *cepeæ foliis lucidis, capitulis albis*; Herm. Parad. 15. t. 15. f. 2.)—Spikes sessile, solitary, ovate. Calyx smooth. Leaves linear, spatulate, smooth. Stem creeping.—Native of the sandy sea-shores of the West Indies, and South America.

4. Ph. *brasiliانا*. (*Gomphrena brasiliانا*; Linn. Sp. Pl. 326. Willd. Sp. Pl. v. 1. 1322. Jacq. Ic. Rar. t. 346.)—Leaves elliptic-oblong. Spikes aggregate, sessile or stalked. Bractees pinnatifid. Stem erect.—Native of the Brasils. Much larger than any of the foregoing. Stem bent, ascending, three feet high, somewhat shrubby. Leaves drooping, four or five inches long, acute, smooth, with downy ribs. Spikes numerous, crowded, partly stalked, ovate, white, brittle. Bractees and calyx pinnatifid and fringed.

These two last species are referred hither at the suggestion of Mr. Brown. See *GOMPHRENA*.

PHILPOT, JOHN, in *Biography*, an English divine, was born in Hampshire, and educated in New college, Oxford. He became a zealous reformer in the reign of Edward VI., and was made archdeacon of Winchester. At this period he was so inflamed with zeal for orthodoxy, that having been engaged in a dispute with an Arian, he spit in his face, to shew the great detestation which he entertained against that heresy. He afterwards wrote a treatise to justify this unmannerly expression of his zeal, saying that he was led to it, to relieve the sorrow he had conceived from such horrid blasphemy, and to signify how unworthy such a miscreant was of being admitted into the society of any Christian. In the reign of Mary, Philpot fell into the hands of people as zealous as himself, but more powerful, and, being a Protestant, was condemned to the flames. He suffered in Smithfield in 1555. Hume's Hist.

PHILTER, PHILTRE, *Philtrum*, in *Pharmacy*, &c. a strainer, or filter; which see.

PHILTER, *Φιλερον*, formed of *φιλειν*, I love, is also used for a drug, or preparation, or charm, which it is pretended will excite love.

Philters are distinguished into true and spurious: the spurious are spells or charms, supposed to have an effect beyond the ordinary laws of nature, by some magic virtue; such are those said to be given by old women, witches, &c.

The true philters are supposed to produce their effect by some natural and magnetical power. There are many enthusiastic authors, who believe in the reality of these philters; and allege matter of fact in confirmation of their opinion: among the rest is Van Helmont, who says, that, upon holding a certain herb in his hand for some time, and taking afterwards a little dog by the foot with the same hand, the dog followed him wherever he went, and quite deserted his former master.

He accounts for the phenomena of love transplanted by the touch of an herb; by asserting, that the heat communicated to the herb, not coming alone, but animated by the emanations of the natural spirits, determines the herb towards the man, and identifies it to him: having then received this ferment, it attracts the spirit of the other object magnetically, and gives it an amorous motion. But all this is mere cant; and all philters, whatever facts may be alleged in their favour, are mere chimeras.

Naturalists ascribe an effect, somewhat of kin to that of a philter, to cantharides taken inwardly: these, it is true, tend to excite love, or rather lust; but it is lust in the general, not determined to any particular object; and they do it no otherwise than by irritating the fibres of the nerves and muscles,

muscles, by whose action the emissio feminis is effected. See FILTER.

PHILTRATION, or FILTRATION. See FILTRATION.

PHILYCA, in Botany. See PHYLICA.

PHILYDRUM, received that appellation from sir Joseph Banks and Dr. Solander, in allusion to the watery situations in which it delights; the word being composed of  $\varphi\iota\lambda\alpha\varsigma$ , to love, and  $\upsilon\delta\omega\rho$ , water. Willdenow unaccountably prints it *Phylidrum*.—Gært. v. 1. 62. t. 16. Schreb. 782. Willd. Sp. Pl. v. 1. 17. Mart. Mill. Dict. v. 3. Brown. Prodr. Nov. Holl. v. 1. 264. Ait. Hort. Kew. v. 1. 9. Roscoe Tr. of Linn. Soc. v. 8. 342. t. 20. f. 5. Lamarck Illustr. t. 4. (Garciana; Loureir. Cochinch. 14.)—Class and order, *Monandria Monogynia*. Nat. Ord. *Scitamineæ*, Roscoe. *Juncea?* Brown.

Gen. Ch. Cal. none; unless the bractea be taken for a sheath. Cor. Petals two, inferior, vertical, opposite, divaricated, ovate, withering. Stam. Filaments three, combined at their lower part, inserted into the base of the upper, or outer, petal, shorter than the corolla; the two lateral ones leafy, jagged, abortive, (sometimes distinct, very rarely furnished with anthers, *Brown*); the perfect one linear, abrupt, pointless; anthers of two separate oblong lobes, parallel, united to the upper part of the filament in front. Pist. Germen superior, ovate, compressed; style thread-shaped, erect, rather longer than the filament, embraced by the lobes of the anther; stigma dilated, capitate. Peric. Capsule oblong, with three furrows, of three cells and three valves, the partitions from the centre of the valves. Seeds cylindrical, numerous, inserted horizontally, in several rows, into the inner margins of the partitions.

Eff. Ch. Calyx none. Petals two, opposite. Barren filaments two, leafy. Anther two-lobed, embracing the style. Capsule superior, of three cells and three valves. Seeds numerous.

Obs. Mr. Brown has, with great judgment, pointed out the collateral affinity, at least between this very singular genus and the no less puzzling, hitherto misunderstood, *Burmannia*, as well as their common relationship, in some degree, to *Xyris*. They are all extremely curious, and *Phylidrum* in particular betrays some odd affinities, which render its natural order highly problematical. We still incline most to our excellent friend Roscoe's opinion on this subject; the structure of the stamens and anther, the presence of barren filaments, with the position of the style, being so very like the *Scitamineæ*, and so unlike every thing else.

1. Ph. *lanuginosum*. Woolly Phylidrum. Gært. v. 1. 62. Willd. n. 1. Ait. n. 1. Brown. n. 1. Curt. Mag. t. 783. (Garciana cochinchinensis; Loureir. Cochinch. 15.)—Bracteas, flowers, and capsules woolly. Lobes of the anthers spiral.—Gathered by Loureiro in watery places in Cochinchina, as well as near Canton; by sir J. Banks about Endeavour river; by Dr. White and Mr. Brown, at Port Jackson, New South Wales, as well as by the last mentioned botanist in the tropical part of New Holland. It is said to have been introduced by sir J. Banks into the stoves at Kew in 1801; but was first figured from Mr. Woodford's collection, near Vauxhall, in 1804, where it flowered in June. Root fibrous, biennial. Stem three or four feet high, erect, leafy, round, alternately branched in the upper part, where it becomes purplish and woolly. Leaves sword-shaped, long and narrow, entire; the radical ones largest; the rest sheathing, alternate. Spikes long, terminal, solitary, erect, simple, many-flowered, woolly. Bracteas ovate, long-pointed, reflexed while the flower is expanded, then again erect, as at first. Flowers yellow, without scent, expanding about an

inch. Mr. Brown observed the lobes of the anthers in this species to be spiral. The seeds are rough with tubercles, and crowned each with a cup-like border.

2. Ph. *pygmaum*. Dwarf Phylidrum. Brown n. 2.—Bracteas, flowers, and capsules smooth. Lobes of the anthers kidney-shaped.—Discovered on the south coast of New Holland, by Mr. Brown, who, besides the differences indicated in the specific character, found the seeds smooth or even, and destitute of a terminal crown.

PHILYRA, in *Natural History*, a name given to the substance on which some of the most ancient books are written. It is the inner bark of the tilia, or common lime-tree. The emperor's library at Vienna has a book, written by Tully, never yet published, which is written on this substance.

PHIMOPOLIS, in *Ancient Geography*, a town of Thrace, at the mouth of the Euxine sea. Pliny. Ptolemy.

PHIMOSIS, or PHYMOSIS, from  $\varphi\iota\mu\omega\varsigma$ , to tie up, in Surgery. When the opening of the prepuce is so much contracted that this part cannot be drawn backward sufficiently to uncover the glans penis, the complaint is termed by surgeons *phymosis*. The disease often arises from a thickening of the cellular substance of the prepuce, brought on by some kind of irritation. It most frequently owes its origin to a chancre; in many instances, it is an effect of gonorrhœa, or of simple inflammation and excoriations beneath the prepuce. The latter part is often severely inflamed, and presents an anafarcous appearance, occasioned by the extravasation of serum.

Numerous subjects are born with a contraction of the aperture of the prepuce, and the case is then called a *natural* or *congenital* phymosis.

Sometimes, in adults, and particularly in old persons, the prepuce contracts so much, without any evident cause, that its cavity becomes filled with urine during the act of making water, and great pain is the consequence.

In cases where the opening is exceedingly small, and the disorder is either congenital, or has occurred without obvious inflammation, it is by no means an uncommon circumstance for calculi to be formed under the prepuce. These sometimes resemble in shape the glans, on which, as it were, they are moulded.

When the phymosis is congenital, and has existed a long while, it frequently happens, that in consequence of inflammation, adhesions have taken place between the glans and the prepuce, and, in this event, it may not always be in the power of the surgeon to effect a cure. The possibility of doing so must depend, in a great measure, upon the extent and firmness of the adhesions. According to Richerand, it is seldom practicable to destroy them, after the patient has attained the age of puberty.

In some cases, a phymosis is productive of very bad consequences, especially when it is accompanied with chancres behind the glans; for as the latter part is situated between the fores and the orifice of the prepuce, it frequently hinders the pus from finding its way outward; consequently, there is an accumulation of matter behind the corona glandis; and this kind of abscess produces ulceration on the inside of the prepuce. When the matter has made its way out, the glans often protrudes through the opening, throwing the whole prepuce to the opposite side.

No operation ought to be practised on children for the natural phymosis, unless pressing inconvenience should immediately arise from the malformation. The constriction generally goes off, as such subjects approach the adult state.

When a phymosis originates from the irritation of a chancre, a gonorrhœa, or excoriation beneath the prepuce, the

best treatment consists in making the patient remain quietly in bed, in injecting very frequently the saturnine lotion underneath the prepuce, and in applying round the penis linen wet with the same remedy. These measures are not to interrupt the exhibition of mercury, when a chancre is known to be present. When the patient is not taking the latter mineral, his bowels must be kept well open with a solution of the magnesiæ sulphas in the infusum sennæ. When a phymosis is occasioned by the lodgment of acrid sebaceous matter beneath the prepuce, nothing gives relief more expeditiously than uncovering the corona glandis, if possible, and washing the parts well with soap and water. Then the employment of the saturnine lotion, both as an injection and an application for keeping the inflamed parts cool, and the exhibition of a saline purgative, or two, will soon accomplish a cure.

As in cases of phymosis, extensive sloughing is not an uncommon consequence of operations performed on the prepuce, during its inflamed and œdematous state, the writer of this article has ever entertained an aversion to the practice. In his opinion, no inflamed phymosis can ever require the employment of the knife, if we exclude the particular instance in which the matter accumulates under the prepuce, and cannot make its escape, except by ulceration. The application of dressings to sores is never a sufficient reason; for these may be washed and kept clean, by frequently injecting suitable lotions under the prepuce; and if they are chancres, they will almost always heal when thus treated, and a due quantity of mercury has been exhibited.

When matter is completely confined beneath the prepuce, behind the glans, a puncture may be made into the collection of pus with a lancet, and through this opening proper lotions should be injected.

The cases which truly demand an operation, are such as are natural, and do not amend as the patient advances to the adult state; such as occur without acute inflammation, and to all appearances spontaneously; and others, which arise from the puckering of the prepuce, in consequence of former ulcerations.

At one time it was the ordinary practice to perform the operation, by slitting open the prepuce with a curved bistoury, a little on one side of the centre of its upper part.

The deformity of the prepuce, occasioned by this mode of operating, and the annoying friction to which the angles of the part are continually exposed, have been such as to induce some surgeons to recommend an attempt to unite the divided part again. Fabricius ab Aquapendente advised a patient, who was thus incommoded, to submit to an operation, resembling that for a hare-lip; but the author does not state whether it was actually performed. Bertrandi, however, was acquainted with a surgeon at Paris, who endeavoured to reunite the part by means of the twisted suture; but could not succeed.

The most judicious surgeons now prefer circumcision. The prepuce is taken hold of with a pair of forceps, and as much of the part being left out as seems necessary to be removed, the surgeon cuts a complete circle of it off by one stroke of the knife, and if the inner membrane of the prepuce should still appear to be too tight, it must be divided. The external skin of the part is then generally kept from becoming separated from the inner membrane by means of a fine suture. The bleeding vessels do not often require ligatures: Bertrandi cut off the whole prepuce in three instances, but without any hemorrhage of importance. Consult Hunter on the Venereal; Fabricius de Chirurg. Operationibus, cap. 61; Bertrandi Traité des

Operations de Chirurgie; Samuel Cooper's First Lines of Practice of Surgery, chap. 55, edit. 3, &c. &c.

PHINTONIS INSULA, in *Ancient Geography*, an island of the Mediterranean, between Sardinia and Corsica. Ptolemy and Pliny.

PHIPPS'S ISLAND, in *Geography*, an island in the Mergui archipelago, about eight miles in circumference. N. lat. 10° 8'.

PHIRSOVA, a town of Russia, in the government of Irkutsk, on the Amur; 20 miles N. of Stretensk.—Also, a town of Russia, in the government of Tobolsk; 20 miles E.N.E. of Ischim.

PHISON, in *Ancient Geography*, a town of Asia, in Armenia; 8 miles N.W. of Martyropolis.

PHITIUSA, or PITIUSA, an island of the Ægean sea, in the vicinity of the Peloponnesus.

PHLA, an island of Africa, in the Triton lake, in Libya, according to Herodotus.

PHLAGUSA, a town in the neighbourhood of that of Troy, situated in the Chersonesus.

PHI-ASMA, from φλασ, *to bruise*, in *Surgery*, a contusion.

PHLEBOCARYA, in *Botany*, from φλεβ, φλεβος, *a vein*, and καρυν, *a nut*. Brown Prodr. Nov. Holl. v. 1. 301.—Class and order, *Hexandria Monogynia*. Nat. Ord. *Hæmodoraceæ*, Brown.

Ess. Ch. Petals six, superior, beardless, permanent. Stamens inserted into the base of each petal. Anthers square, nearly sessile. Germen of one cell, with three seeds. Style thread-shaped. Stigma simple. Nut coated, crowned, single-seeded.

1. *Ph. ciliata*. Gathered by Mr. Brown on the south coast of New Holland. A perennial herb, with scarcely any stem. Leaves in two rows, equitant, narrow-sword-shaped, fringed. Panicle nearly sessile, shorter than the leaves. Flowers small, with a solitary bractea to each. Nothing is said of the colour of the flowers. We have called petals what Mr. Brown terms a *perianth*, to preserve the necessary analogy with HÆMODORUM; see that article, and HÆMODORACEÆ.

PHLEBOLITHIS, from φλεβ, φλεβος, *a vein*, and λιθις, *a little stone*, was so called by Gærtner, on account of the numerous white veins, lining the hard shell of the nut. He took his description and figure from a specimen in the collection of seeds at the Amsterdams garden, without knowing any thing of the plant, or even the entire fruit to which it belonged. Juslieu observes, Gen. 453, that this seed seems akin to *Mimusops*, Gærtn. t. 42; and indeed the author himself had already advanced the same opinion. See Gærtn. v. 1. 201, 2. 1. 43. f. 2. *Ph. indica*.

PHLEBORRHAGIA, from φλεβ, *a vein*, and ραι, *to flow*, in *Surgery*, bleeding from a vein.

PHLEBOTOMUS, a lancet, or steam for bleeding.

PHLEBOTOMY, from φλεβ, *a vein*, and τομω, *to cut*, the operation of opening a vein; venesection. See BLEEDING.

PHLEGM, φλεγμα, in *Chemistry*, an aqueous and insipid fluid, supposed to be found in all natural bodies, and obtained from them by distillation or otherwise; coinciding with what the other philosphers call *water*.

Phlegm makes the fourth of the chemical elements, or elementary principles. But the term is now little used.

PHLEGM, φλεγμα, in *Medicine*, called by the Latins *pitiuita*, seems to be derived from φλεγο, *I burn*, yet its signification is very opposite to that of inflammation. The ancient physicians spoke of phlegm, as one of the four humours existing in the body, and giving the qualities of cold and moisture to the constitution; whence the *phlegmatic* temperament stood in opposition to the *sanguine*, and phlegm was supposed

supposed to predominate in dropical diseases. The later writers spoke of phlegm as a crude, aqueous, mucous fluid, of an excrementitious nature, which prevailed before the proper concoction took place. By the older chemists, the term phlegm was applied to the purest state of water, when deprived by distillation of all heterogeneous matter.

**PHLEGMAGOGUES**, from φλεγμαξ and αγω, *I expel*, an epithet given to such purgative medicines as were supposed to occasion a particular evacuation of pituitous or watery humours. These were purgatives of a violent and drastic nature. See **CATHARTICS**.

**PHLEGMASIA**, φλεγμασία, signifies *inflammation*, or fever accompanied with inflammation, the derivation from φλεγω being here adopted. Sauvages constituted his third class, comprehending inflammatory diseases, with the title of *Phlegmasie*; and Dr. Cullen adopted the same appellation for his second order of Febrile Diseases, which includes all the *inflammatory fevers*. See their respective systems of nosology. See also **NOSOLOGY**.

**PHLEGMATIA**, from φλεγμα, *pituita*, as also *leucophlegmatia*, is synonymous with *œdema* and *anasarca*, or dropy of the skin. Whence

**PHLEGMATIA Dolens** has been appropriately applied to denote a peculiar and painful swelling, occurring in one of the lower extremities in women, during their confinement in child-bed.

This disease is not of very frequent occurrence; and hence it appears to have been altogether overlooked, or but very slightly noticed, by the older writers on the diseases of puerperal women. Mr. White of Manchester was the first to point out fully the nature and appearances of the disorder to the notice of medical men in this country, in his work published in 1784, entitled "An Inquiry into the Nature and Cause of that Swelling in one or both of the Lower Extremities, which sometimes happens to Lying-in Women." In the year 1792, the subject was again taken up by Mr. Trye, of Gloucester, who published a small essay, under a similar title. Since that period Dr. Ferriar, in the third volume of his *Medical Histories and Reflections*, and Dr. Hull, in a separate work, have discussed the nature of the disease. Several of the continental writers, however, had been acquainted with this disorder; and even our own countrymen, Wiseman, sir Richard Manningham, and others, had cursorily noticed it. But the first ample account of the disease appears to have been drawn up by Puzos, a celebrated Parisian accoucheur, who died in 1753, in his "Mémoires sur les Dépôts lacteux," printed at the end of his "Traité des Accouchemens." About the same time, another eminent accoucheur in France, Levret, described the disease at considerable length, under the appellation of "Engorgemens lacteux dans le Bassin et aux Extrémités inférieures." (See his "Art des Accouchemens," part iii. chap. 3. § 7.) The disease was also noticed by Astruc, Lieutaud, Sauvages, Selle, and others, under corresponding appellations, in consequence of their adoption of the same hypothesis respecting its nature and origin; namely, that it was occasioned by metastasis of the milk, which was supposed to be deposited in the cellular membrane of the pelvis and lower extremities, instead of being carried to the breast, or to be taken up from the breasts by the absorbent vessels, and carried thither. Sauvages has included the various forms of this *infiltration lacteuse*, or milky deposit, under two or three different genera in his nosology, calling it *Phlegmatia lactea*, *Ischias ab Sparganosi*, *Hysteralgia lactea*, and *Hysteralgia ab Sparganosi*, respectively. (See his *Nosol. Method.* See also Calliseu, *Syst. Chir. Hodiern.* p. ii. § 34—39. Van Swie-

ten, *Comment. ad Aph.* 1329. Plenck, *Inst. Chirurg.* p. 378, ed. 3.) It is not now necessary to enter into any refutation of this hypothesis, which the more accurate anatomical investigations of modern times have entirely disproved, and which all English writers, from Mr. White downwards, have justly discarded. We shall, therefore, proceed to relate the symptoms of the disease.

In about twelve or fifteen days after delivery, the patient is seized with great pain in the groin of one side, accompanied with a considerable degree of fever, which, however, is seldom preceded by rigor or shivering. This part soon becomes affected with swelling and tension, which extend to the labium pudendi of the same side only, and down the inside of the thigh, to the ham, the leg, the foot, and the whole limb: the progress of the swelling is so quick, that in a day or two the limb becomes twice the size of the other, is moved with great difficulty, and is hot and exquisitely tender, but without any external appearances of inflammation. The pain in the groin is generally preceded by a pain in the small of the back, and sometimes by a pain at the bottom of the belly on the same side: the parts which suffer the most pain, are the groin, the ham, and the back part of the leg about its middle. The pain indeed extends over the whole limb, in consequence of the sudden distention; but in a day or two it becomes less severe. The swelling is general and equal over the whole limb; it is much harder and firmer than in *anasarca*, in every stage of the disorder; it is not so cold, in any state of the disease, as the dropical swelling, nor so much diminished by a horizontal position, neither does it *pit* when pressed upon by the finger, nor does any water issue from it when it is punctured by means of a lancet. The surface is very smooth, shining, and pale, and is even and equal to the touch in every part, except where the conglobated glands are situated, which in some cases are knotty and hard, as in the groin, the ham, and about the middle of the leg, at its back part.

This disorder generally comes on in the second or early in the third week after parturition. But Mr. White mentions one instance in which it commenced as early as twenty-four hours after delivery, and another as late as five weeks; but these are rare and extreme occurrences. The disease subsides in the following order: first the pain and swelling of the groin and labium pudendi begin to remit, next those of the thigh, and lastly those of the leg.

The fever in some patients subsides in two or three weeks, in others it continues six or eight weeks, attended with quick pulse and hectic symptoms. The disease sometimes attacks both extremities; but this rarely happens, perhaps not in one case in ten. After the disorder has existed a week or two, it is not uncommon for the sound leg to swell towards evening, and become œdematous; but then the groin and thigh are not affected on that side, and the leg is much softer to the touch than the other, and pits when pressed upon by the finger. Mr. White affirms, that he has never known it to suppurate or prove fatal, or to be followed by any material inconvenience, after a few months were elapsed, except a little swelling of the leg after fatigue, particularly after walking.

Neither the predisposing nor the exciting causes of this disease are very obvious. It attacks women who are in full strength, and those who are reduced by flooding; those who have a moderate discharge of the lochia, and those who have a small or a large quantity; those who give suck, and those who do not, whether their breasts be drawn or not, and whether they have a great deal or little milk. It attacks women in whatever position they have been delivered; but of

those

those who were delivered on the side, it appears that the greater number were affected on that side in which they lay at the time of delivery. It attacks women of all ranks and of different habits, both the rich and the poor; the most healthful, as well as those who have laboured under chronic diseases; the strong and the weak, the lean and the corpulent; the sedentary and the active; the young and the middle-aged; after the first or any other labour, and whether the labour be natural or preternatural. It happens at all seasons of the year indiscriminately; and in the country as well as in large towns. It never attacks either of the arms, or other parts of the body; and though it sometimes occurs in both the lower extremities, in the same or in different lymphatics, it never attacks the same limb more than once.

In a subsequent publication on the disease, Mr. White states more strongly, that the limited swelling of the labium pudendi on one side only, is to be considered as constituting the principal diagnosis of the phlegmatia dolens. The swelling is so exactly confined, he says, to the labium pudendi of that side, that if a line were drawn from the navel to the anus, it would be found never to go beyond that line, in the smallest degree; and this pathognomonic symptom, he adds, is never wanting in any case whatever. "About nine times out of ten it attacks one side only, and the limits are so exactly drawn, that in no case whatsoever does the swelling rise higher than the loins and the hypogastric region, nor spread wider than the spine and linea alba; and this is so constantly and invariably the case, that it may be confidently said, *so far shalt thou go, and no farther.*" See an Inquiry into the Nature, &c. of that Swelling in one or both the Lower Extremities, &c. part ii. p. 7. (1801), and part i. p. 7. 1792.

This limited state of the swelling has led modern authors in general to consider the disease as principally seated in the lymphatic vessels and glands. The exact state of these parts, however, has not been clearly made out, and the different writers above quoted have attempted to explain it in different ways; all of them, however, speaking conjecturally, and none of them appearing to make out an hypothesis satisfactory in all its parts. Mr. White considers the swelling of the limb to be occasioned by an obstruction in the trunks of the lymphatic vessels, and the consequent detention and accumulation of the lymph in the limb. This obstruction, he conjectures, may be occasioned by inflammation in the trunk or trunks of these vessels, brought by pressure during parturition, or by actual rupture of them. Mr. Trye is of opinion that the origin of the obstruction is seated solely in the lymphatic glands in the groin, which are inflamed, and therefore incapable of admitting the transit of the lymph through them. To this supposition, however, it is justly objected, that inflammation in the inguinal glands is extremely apt to terminate in suppuration; whereas suppuration does not occur in phlegmatia dolens: not to mention, that a tenderness and enlargement of these glands, though occasionally observed in this disease, is not always present, is often very slight, or does not exist at all until the complaint is considerably advanced.

Dr. Hull, in an able and learned treatise on this disease, after a consideration of the unsatisfactory nature of these theories, proposes another explanation of the seat and phenomena of the complaint. He considers it as consisting of a peculiar inflammation, seated in the muscles, cellular membrane, and interior surface of the skin, and producing a rapid effusion of serum and coagulable lymph from the exhalants into the cellular membrane of the limb. The exquisite pain, tenderness, and heat of the limb, as well as the fever-

ishness which accompanies it, he thinks, are thus satisfactorily explained, independently of any primary affection of the lymphatic system, which may be involved in the progress of the disease.

On the whole, this appears to afford the most rational explanation, both of the symptoms of the disease and of the mode of its occurrence. Dr. Hull remarks, that, under the increased irritability and inflammatory diathesis connected with pregnancy and the puerperal state, various causes may excite this sort of inflammation, especially in the lower extremities, in which a great determination of blood has taken place during the latter months of utero-gestation; such as contusions, or even violent exertions of the lower portions of the abdominal muscles, or those of the pelvis and thighs, cold and moisture, suppression or diminution of the lochia or milk, inducing a plethoric state, too much or too stimulating food, too early walking or much standing, &c. As the disease seldom takes place before the twelfth or fourteenth day after delivery, and sometimes considerably later, it is certainly more probable that it should be occasioned by some cause subsequently applied, than by any injury sustained at the time of parturition.

*Of the Cure of Phlegmatia dolens.*—The different views which have been taken of the nature of the disease by different practitioners, have necessarily led them to propose different methods of treatment. Mr. White justly observes, that the mode of cure must be varied with the different stages of the disorder. The *first stage*, which may be called the inflammatory, he recommends to be treated in the antiphlogistic method; but as he considers the inflammation not as the original disease, but as secondary or a symptom only, occasioned by the distention of the lymphatic vessels and glands; so he deems it neither necessary nor prudent to waste the patient's strength by large evacuations. He advises the use of laxative medicines and glysters, for the purpose of keeping the bowels open; the application of blisters to the upper part of the thigh, with the view of evacuating some of the effused fluids and relieving irritation in the part originally affected; and the administration of opiates internally, together with the external use of anodyne fomentations, and of the warm and vapour bath, for the purpose of alleviating the pain. At the same time, he prescribes cooling diaphoretic medicines, with acidulated drinks, fruit and cool air, in order to moderate the general feverish disposition. In the *second stage*, when the violence of the pain abates, and the swelling and tension of the groin, labium, and upper part of the thigh begin to lessen although some degree of feverishness remains, he recommends a fuller diet, and a more tonic medicine, with an occasional small dose of calomel. He advises also, that gentle friction should be employed upon the limb, with warm oil, and that the patient should use the Buxton bath, or water heated to 82 degrees Fahrenheit's thermometer, which may be gradually lowered to 76, the temperature of that of Matlock. The *third*, and last stage, may be said to take place, when the pain and fever have entirely left the patient, and no complaint remains except the swelling of the limb, and some degree of debility. He then prescribes the cinchona, with or without chalybeates, together with sea-bathing, or the cold-bath at home, where a resort to the sea is inconvenient. He recommends also embrocations with camphorated spirit, or distilled vinegar, dipping the limb in cold water, gentle friction upwards, the use of a calico bandage, carefully and properly applied, and exercise on horseback; and considers much walking as injurious in every stage of the disease.

Mr. Trye's method of treatment differs from that of Mr. White,

White, principally in the more active employment of local evacuations, from the groin, as he considers the inflammation of the lymphatic glands to be the primary cause of the disease. He therefore applies both leeches and blisters to the part, while he administers laxatives and emetics internally; and, in more obstinate cases, introduces mercury so as to make it pass through or near the glands and lymphatic trunks affected.

Dr. Hull divides the disease into three stages, after the manner of Mr. White, and treats the *first*, or inflammatory stage, upon the same antiphlogistic principles, applying leeches and blisters to moderate the local action, and emollient fomentations, liniments, and ointments, to relieve the tension of the skin. The *second* stage does not require or bear evacuations; but the other parts of the antiphlogistic treatment, such as rest, the removal of irritations, gentle diaphoretics and sedatives, the warm bath, &c. must be continued; and the topical affection is to be remedied by gently stimulating liniments. The *third*, or *asthenic* period, requires the administration of tonics, and stimulants, and exercise, especially in a carriage; while at the same time the topical affection must be treated, by the application of a tight bandage, by the cold bath, or cold water dashed on the limb, and by remedies which may increase the action of the absorbents, such as blisters, friction, heat, electricity, &c. and by the internal medicines, which excite absorption, such as mercury, digitalis, alkalies, &c. These remedies, particularly the evacuations, will of course be regulated according to the vigour and habit of the patient.

There is, in fact, little essential difference in the practice recommended by the different writers on this singular disease, which is often very obstinate and of long continuance, notwithstanding the vigorous application of the remedies above-mentioned. Of a disease of comparatively rare occurrence, (for of 1897 women delivered at the Westminster General Dispensary, only five were affected with this malady, and of 8000 delivered in Manchester, only four,) any individual practitioner cannot have witnessed a sufficient number, to enable him to appreciate satisfactorily the most effectual mode of practice. In three or four cases, which we have seen, the importance of free purging appeared to be decidedly established; and while, in the first, the use of warm fomentations, so far from alleviating the pain in the early stage, seemed to aggravate the sufferings of the patient; in the case last treated, both the violence of the pain and the duration of the disease, appeared to be greatly diminished, by cooling the limb by frequent *tepid* and *cold washing*. See Report of the Dispensary in Carey-street, in the *Edin. Med. and Surg. Journal* for Jan. 1807, vol. iii. Also, An Essay on the Swelling of the Lower Extremities incident to Lying-in-women, by Charles Brandon Trye, 1792, and an Essay on Phlegmatia Dolens, by John Hull, M.D., Manchester, 1800.

**PHLEGMATIC**, an epithet given to one of the four temperaments by the ancients, in which the prevalent humour was considered to be *pituita*, or *phlegm*; whence the diseases to which the phlegmatic temperament was subject, were said to be *defluxions*, *rheums*, and other cold discharges. See **TEMPERAMENT**.

**PHLEGMON**, or **PHLEGMONE**, from *φλεγω*, to burn, a term signifying common, or healthy, acute inflammations. See **INFLAMMATION**.

**PHLEGON**, in *Biography*, one of the freedmen of the emperor Adrian, who was brought up to letters, and survived to the 18th year of Antoninus Pius. He was author of various works, of which the most important was entitled, "Olympiads," or "Chronicles," in sixteen books, brought

down to the year 137 of the Christian era. This contained an account of the remarkable events occurring in every year of the Olympiads. Phlegon also wrote a work "De Mirabilibus," and another, "De Longævis." Of his "Opuscula," the best editions are that of Meurcius, and that of Franzius, the former printed in 1620, and the latter in 1775.

**PHLEGRÆI CAMPI**, *Phlegrean* or *Burnt Fields*, in *Ancient Geography*, a district of Campania, or Campagna, in Italy, of which the ancient mythologists have given very pompous descriptions. This, they say, was the scene of the combats between the giants and the gods, and of the victory over them gained by Jupiter. The territory thus denominated appears to have experienced in a great degree the destructive effects of subterranean fires. Accordingly we here find Vesuvius, the Solfatara still smoking, as the poets have pretended, from the effects of Jupiter's thunder; the Monte Nuovo, which was suddenly thrown up from the bowels of the earth on the day of St. Michael's feast, in the year 1538, as if the sons of Titan had intended to renew the war; the Monte Barbara, formerly Mons Gaurus, the favourite of Bacchus, the grotto of the Cumæan Sibyl, the noxious and gloomy lakes of Avernus and Acheron, the green bowers of Elysiun, &c. &c. It is not improbable that these objects terrified the Greeks, in their first voyages to this coast; and that they were afterwards embellished and exaggerated by the fancy and fiction of the poets. It remained for the geographer and natural historian to develop the facts which had been thus disguised by the poets. See **TARTARUS** and **TITANS**, and also **CUMÆ** and *Cumæan SIBYL*.

**PHLEOS**, in *Botany*. See **PHLEOS**.

**PHLEUM**, *φλεων*, or *φλωες*, in Greek, a name adopted by Linnæus for the *Gramen typhinum* of preceding botanists, our Cat's-tail-grass. This indeed has little connection with the ancient plant, except the latter might be, as some suppose, our *Typha*, which the *Phleum* resembles in shape.—Linn. Gen. 33. Schreb. 47. Willd. Sp. Pl. v. 1. 354. Mart. Mill. Dict. v. 3. Sm. Fl. Brit. 68. Prodr. Fl. Græc. Sibth. v. 1. 41. Ait. Hort. Kew. v. 1. 145. Schrad. Germ. v. 1. 182. Juss. 29. Lamarck Illustr. t. 42. Gærtn. t. 1.—Class and order, *Triandria Digynia*. Nat. Ord. *Gramina*.

Gen. Ch. *Cal.* Glume single-flowered, oblong, linear-lanceolate, compressed, of two, nearly equal, straight, compressed, clasping, concave valves, each tipped with a point; their inner membranous margin abrupt or oblique. *Cor.* of two awnless valves, shorter than the calyx, and concealed within it; the outermost embracing the smaller inner one. Nectary of two ovate, concave, acute scales. *Stam.* Filaments three, capillary, longer than the calyx; anthers oblong, forked at each end. *Pist.* Germen roundish, superior; styles two, capillary, reflexed; stigmas feathery. *Peric.* none, the calyx and unchanged corolla enfolding the seed. *Seed* solitary, roundish, clothed with the corolla, but not united to it.

Eff. Ch. Calyx single-flowered, of two, nearly equal, awn-pointed valves, enclosing the two-valved awnless corolla. Seed invested with the unchanged corolla.

Obs. Much difference of opinion has existed among botanists, respecting the limits between this genus and *Phalaris*, chiefly on account of the abrupt inner margin of the calyx-valves, attributed to *Phleum* by Linnæus. Schreber and Schrader, two excellent judges, though they differ somewhat in the denomination of the parts in *Phalaris*, have determined these genera on the same principles as we have here adopted. Hence numerous species, hitherto deemed ambiguous, are referred to *Phleum*, with which they agree in habit,

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habit, though they have not the abrupt calyx. Their single corolla, which does not, as in the real species of *Phalaris*, become hardened and united with the seed, is certainly a much more important and well-defined character. See PHALARIS.

1. *Ph. pratense*. Common Cat's-tail-grass. Timothy-grass. Linn. Sp. Pl. 87. Schrad. n. 1. Schreb. Gram. 102. t. 14. Mart. Rust. t. 5. Knapp. t. 6. Engl. Bot. t. 1076. (Gramen typhinum majus et minus; Ger. Ein. 11, 12.)—*Ph. nodosum*; Linn. Sp. Pl. 88. Leers 17. t. 3. f. 2. Fl. Dan. t. 380.—Cluster spike-shaped, cylindrical, obtuse. Valves of the calyx abrupt, fringed at the keel. Awns shorter than the calyx. Common in meadows and pastures throughout Europe; most luxuriant in such as are moist and rich. In a dry or fluctuating soil, the lower joints of the stem become bulbous, and the whole plant diminished. It is perennial, flowering from June to October; and by means of some reports from America, was at one period celebrated by agriculturists, under the name of Timothy-grass, after its introducer, Mr. Timothy Hanson. Its reputation proved fallacious, as has happened in other similar cases. The climates of America and Europe, though in some respects alike, are, in many others, far too different, for the success of an agricultural grass, in one of those countries, affording any probable reason for its utility in the other. The plant before us is known from every other common grass by its dense cylindrical spike, (or rather cluster, as the flowers are not sessile, but stalked and fasciculated,) and the very abrupt inner edges of its calyx. The root creeps moderately. Stem erect, three or four feet high, except when starved, roughish, as are also the leaves, and their long sheaths. Spike erect, purplish, from two to four or five inches in length, of innumerable fringed flowers, whose awns are half the length of the calyx, and slightly spreading. The tawny anthers are large and conspicuous, hanging loosely out of the flowers. The Rev. H. Davies has observed the flowers to be occasionally viviparous in Anglesea.

2. *Ph. alpinum*. Alpine Cat's-tail-grass. Linn. Sp. Pl. 88. Schrad. n. 2. Engl. Bot. t. 519. Fl. Dan. t. 213. Knapp. t. 7. Sm. Tour on the Continent, v. 3. 134. (Gramen typhoides alpinum, spica brevi, densa, et veluti villosa; Scheuchz. Agr. 64. Prodr. 17. t. 3.)—Cluster spike-shaped, ovate-oblong. Valves of the calyx abrupt, fringed at the keel. Awns about as long as the calyx. Root tuberous.—Native of lofty Alpine pastures, in Lapland, Germany, Switzerland and Scotland, flowering about the end of July. Its rather tuberous, somewhat creeping, but never bulbous, root; short ovate cluster; longer hairs and awns of the calyx; and long inflated sheath of the uppermost leaf; are the sufficient marks of distinction between this and every variety of the preceding. The flowers moreover are usually of a darker purplish hue. The height of the stem is from twelve to eighteen inches.

3. *Ph. felinum*. Brittle Cat's-tail-grass. Sm. Prodr. Fl. Græc. v. 1. 42.—Spike ovate. Valves of the calyx abrupt, fringed at the lower part of the keel. Awns longer than the calyx, divaricated, angular, rough. Root fibrous.—Native of Zante, where it is known by the name of *μουσάκια του κατ'ούρνου*, or Cat's whiskers. We have also a Sicilian specimen, from Mr. Bivona Bernardi. The root is fibrous and annual. Stem from one to two feet high, erect, smooth, leafy, branched in the lower part. Leaves light green, nearly smooth; the sheath of the upper one inflated, strongly ribbed. Stipula elongated. Spike ovate, about an inch long, pale, dense. Calyx-glumes very abrupt, white, and membranous at their inner edge; their keel densely

fringed about half way up, and continued into a tapering, angular, rough, but not hairy spreading awn, usually longer than the glume itself.

4. *Ph. asperum*. File Cat's-tail-grass. Schrad. n. 3. Jacq. Ic. Rar. t. 14. Villars Dauph. v. 2. 61. t. 2. f. 4. (*Ph. paniculatum*; Hudf. 26. Sm. Fl. Brit. 70. Engl. Bot. t. 1077. Ait. Hort. Kew. v. 1. 145. *Phalaris aspera*; Retz. Obs. fasc. 4. 14. Willd. Sp. Pl. v. 1. 328. Hofl. Gram. Austr. v. 2. 28. t. 37.)—Panicle cylindrical, spike-shaped. Valves of the calyx wedge-shaped, abrupt, naked, rough, pointed; tumid upwards.—In dry open fields, very rare in England, more common in the south of Europe, flowering about July. Root annual, of many branched fibres. Stems several, branched, leafy, very smooth, near a foot high. Leaves ribbed, roughish, bright grass-green, not glaucous; the long sheath of the uppermost often reaching above the base of the panicle, which is two or three inches long, of the colour of the foliage, lobed, but crowded into a close cylinder, feeling rough, like a file, from the very short rigid awns. The calyx is abrupt, minutely rough; angular or furrowed below; remarkably tumid upward. Valves of the corolla elliptical. Anthers short and pale. Barrelier's t. 28. f. 2. surely cannot but be this grass, though doubted by Schrader.

5. *Ph. Bochneri*. Purple-stalked Cat's-tail-grass. Schrad. n. 4. (*Phalaris phleoides*; Linn. Sp. Pl. 80. Willd. Sp. Pl. v. 1. 328. Sm. Fl. Brit. 63. Engl. Bot. t. 459. Knapp. t. 5. Fl. Dan. t. 531. Hofl. Gram. Austr. v. 2. 26. t. 34. Ehrh. Phytoph. n. 61. (Gramen typhinum, spica conoide striata, culmo violaceo; Barrelier. Ic. t. 21. f. 1.)—Panicle nearly cylindrical, spike-shaped. Valves of the calyx lanceolate, abrupt, roughish, ribbed, pointed. Stem simple. In dry elevated pastures and hilly ground, especially where the soil is sandy, in various parts of Europe. In some parts of Cambridgeshire and Norfolk, but not frequent, flowering in July. Root perennial, of numerous smooth fibres. Stems several together, but each of them quite simple, twelve or eighteen inches high, erect; leafy below; naked, polished, and usually conspicuous for a beautiful purple hue, in their upper part. Leaves linear, rough, acute, rather glaucous; the upper ones short, with very long close sheaths. Stipula very short, abrupt. Panicle near two inches long, dense, a little contracted at each end, glaucous green with a tinge of purple: occasionally pale. Calyx rough, in various degrees, with short hairs; the keel somewhat fringed; each side marked with a strong rib; the inner margin membranous, smooth, coloured, abrupt, or at least oblique, at the top: awns very short, erect. Valves of the corolla elliptical. Anthers twice the length of the last, mostly purple. We have from Dr. Bellardi a Piedmontese specimen of this grass, marked *Phleum perenne*, which however he does not appear to have published. It is much to be wished that some more expressive name could have been found, instead of that which we are obliged to adopt; such as *violaceum*, or *purpurascens*.

6. *Ph. Micheli*. Michelian Cat's-tail-grass. Allion. Pedem. v. 2. 233. Schrad. n. 5. t. 1. f. 2. Engl. Bot. t. 2265. (*Ph. n. 1532*; Hall. Hist. v. 2. 246. *Phalaris alpina*; Hænke in Jacq. Coll. v. 2. 91. Hofl. Gram. Austr. v. 2. 26. t. 35. Gramen typhinum junceum perenne; Barrelier. Ic. t. 21. f. 2.) Panicle nearly cylindrical, spike-shaped. Valves of the calyx lanceolate, taper-pointed, ribbed, with short awns; the keel strongly fringed. Corolla ribbed, hairy. Stem simple.—Native of lofty mountains in Germany, Switzerland, Savoy, and Scotland, flowering in July. Mr. G. Don discovered it on rocky parts of the hills of Clova, Angusshire. Root perennial,

tufted,

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tufted, scarcely creeping. *Stems* a foot or more in height, simple, smooth, erect, leafy more than half way up. *Leaves* broadish, flat, pointed, rough-edged; their sheaths smooth, the upper ones long, and rather tumid. *Stipula* short, blunt. *Panicle* from one and a half to three inches long, erect, thicker than in the last, purplish except when it grows under bushes, by which it becomes pale green and white. The long dense fringes of the *calyx-keels* give the whole a hairy aspect. Their taper-pointed figure, without any abrupt termination of the inner edge, distinguishes this species from all the foregoing, and indeed has induced some persons to refer it to *Phalaris*. The *corolla* is larger, and has more of the habit of the *calyx*, than usual in this genus, being ribbed and more or less hairy, resembling the *corolla* of a *Festuca*, though more obtuse. Villars has certainly, as Schrader observes, confounded this and the last, both in his description and synonyms, under his *Ph. phalaroidesum*, Dauph. v. 2. 60. Our specimen from himself agrees with the last, not with the present.

7. *Ph. arenarium*. Sea Cat's-tail-grass. Linn. Sp. Pl. 88. Ehrh. Calam. n. 132. Schrad. n. 6. Fl. Dan. t. 915. (*Phalaris arenaria*; Hudf. 23. Sm. Fl. Brit. 62. Willd. Sp. Pl. v. 1. 328. Ait. Hort. Kew. v. 1. 138. Engl. Bot. t. 222. Knapp. t. 4. Dickf. H. Sicc. fasc. 18. 2. Gramen typhinum maritimum minus; Pluk., Phyt. t. 33. f. 8.)—Spike scarcely panicled, ovato-lanceolate. Valves of the calyx lanceolate, ribbed, with short awns; the keel strongly fringed. Corolla ribbed, abrupt. Stem branched at the base.—Native of the sandy sea-shores of England, and most other parts of Europe. Occasionally it occurs on dry elevated inland heaths; flowering in June. Though the specific characters of this and *Ph. Micheli* come near each other, the appearance of the two grasses is very different. The present is annual, of humbler growth, glaucous and pale, smooth, branched more or less from the very base. *Leaves* broadish-lanceolate, with long, rather tumid, ribbed, smooth sheaths. *Spike* thick and rather short, bluntish, though contracted towards both ends. *Calyx-valves* precisely lanceolate, not taper-pointed, though tipped with short awns. *Corolla* broad and short, abrupt and somewhat crenate, smooth, with many ribs.

8. *Ph. dentatum*. Toothed Cat's-tail-grass. (*Phalaris dentata*; Linn. Suppl. 106. Willd. Sp. Pl. v. 1. 327. Thunb. Prodr. 19. Retz. Obf. fasc. 4. 14.)—Spike scarcely panicled, cylindrical. Keel of the calyx-valves strongly and bluntly toothed. Stem branched at the base.—Native of the Cape of Good Hope. *Root* fibrous, smooth, apparently annual. *Stems* divided at the base into several branches, from three to six inches high, very smooth and shining, sometimes bent at the joints, and stained below them with dark purple. *Leaves* short and almost awl-shaped, with long, slightly tumid, ribbed sheaths, that conceal nearly the whole stem. *Spikes* terminal, solitary, about an inch and a half long, obtuse, somewhat lobed, but scarcely panicled, sometimes rather downy, as in the Linnæan specimen; Retz found them smooth. *Calyx-valves* lanceolate, pale, tumid, and even at the sides; their keels green, strongly ribbed, and altogether singular in their numerous, prominent, triangular, globular-tipped teeth, which give them an almost artificial and very curious appearance.

9. *Ph. tenuis*. Slender Cat's-tail-grass. Schrad. n. 8. (*Phalaris bulbosa*; Linn. Syst. Nat. ed. 10. v. 2. 869. Sp. Pl. 79. Amoen. Acad. v. 4. 264. Bellardi Act. Taurin. v. 5. 213. Willd. Sp. Pl. v. 1. 327, excluding all the synonyms except Am. Acad. Ph. tenuis; Hoff. Gram. Austr. v. 2. 27. t. 36. Schrad. Gramen typhinum, longillimâ spicâ phalaridis, molli, albicante; Barrel. Ic.

t. 14. f. 1.)—Panicle cylindrical, spike-shaped, very dense. Valves of the calyx elliptic-oblong, roughish, minutely pointed; their lateral ribs very prominent. Stem branched at the base. Corolla obtuse.—Gathered by Hasselquist in the Levant; by Bellardi near Saviliano in Piedmont; by Hoff in Istria, about vineyards, roads, and grassy places. It flowers from May to July. Nothing can be more unaccountable than the name by which Linnæus has distinguished this species, except that it was, probably, merely taken from the synonym of Scheuchzer, which he here erroneously applied, and which properly belongs to *Phalaris nodosa*; see PHALARIS, n. 2. His own specimen, on which the name of *bulbosa* is twice written, and which has all other requisite marks of authenticity, has nothing bulbous about it. The *root* is small, of a few tapering, partly downy, fibres, and appears to be annual. *Stem* more or less branched at the lower part only, above a foot high, simple upwards, slender, erect, round, leafy; purple, smooth and polished in all the naked parts, with slightly tumid joints. Dr. Bellardi's specimen has more subdivisions, though but half so tall. *Leaves* linear-lanceolate, grass-green, roughish, with nearly smooth close sheaths. *Panicles* solitary, erect, about two inches long, close, and exactly cylindrical, one-fourth or one-third of an inch thick. *Calyx-valves* rather obliquely or unequally elliptical, their inner edge being almost straight, and their short points approaching each other; their whole surface is roughish with very minute prominences, but no hairs; the solitary side-ribs very strong and prominent, resembling the keel. *Corolla* not half so long as the calyx; its outer valve much the broadest, ribbed, very obtuse, crenate. This species, so long involved in obscurity, is now made sufficiently intelligible, and its specific name is no longer a stumbling-block, or a contradiction. Willdenow and Schrader have justly enough remarked that the *Phalaris bulbosa* of Cavanilles, Ic. t. 64, deserves that appellation much better than this fibrous-rooted plant; but Cavanilles's is *Phalaris nodosa*, as well as *tuberosa*, of Linnæus, so that a third name is quite needless. See PHALARIS.

10. *Ph. geniculatum*. Bent Cat's-tail-grass. Bellardi Observ. Bot. 54. Mem. de l'Acad. de Turin v. 5. 213.—“Spike nearly ovate. Glumes fringed. Stem bent at the joints.”—Gathered by Dr. Bellardi on Mount Cenis, in barren ground. “*Root* perennial, not bulbous. *Stems* a span or more in height, with three or four bent joints.” *Bellardi*.

Of this we have no specimen from the author, nor did he advert to it, as a new species, when, in company with the writer of this, he gathered it in August 1787. We mention it here merely for future observation.

A few other species either have been referred by authors to this genus, or may seem to belong to it. Of the former is *Phleum crinitum* of Schreber, Sm. Fl. Brit. 71, which if not a good *Agrostis*, as we have considered it in Engl. Bot. t. 1704, constitutes the genus POLYPOGON of Desfontaines and Schrader: see that article. Among the latter are *Phalaris geniculata* and *vaginiflora*, Sm. Prodr. Fl. Græc. Sibth. v. 1. 38. These, according to our reformed ideas of *Phalaris*, cannot remain there; but we are become persuaded that *Cryptis* is a good genus, distinguished, not indeed by its original trifling, as well as erroneous, character, of two stamens, but by the *corolla* being longer than the *calyx*, and, like that, having, to one valve at least, a strong rough keel. On these grounds Schrader has admitted it, in his excellent *Flora Germanica*, where three species are described, to which we can add a fourth, supposed to come from Virginia, with a much branched stem, and long, slender, cylindrical,

dricul, spiked *panicles*. We apprehend however that Schrader misapplies to his *C. schoenoides*, Barrelier's t. 54, which more properly belongs to his *alopecuroides*; a plant formerly given us by the celebrated M. Gerard, at Cottignac, as a rare and little known species. See *CRYSIS*.

Ph. *Gerardi*, Jacq. Ic. Rar. t. 301. Willd. Sp. Pl. v. 1. 355. Schrad. n. 7, still remains in dispute. Jacquin represents it with a bivalve *corolla*, which Schrader confirms. Yet we have found in our specimens, gathered on mount Cenis, only a single valve to that part, which accords with the account of Villars, who had examined living wild plants. Hence we have judged this grass to be an *Alopecurus*, which is confirmed by the dorsal awn of the *corolla*, omitted by Jacquin indeed, but properly described in Schrader. This awn is essential to an *Alopecurus*, but quite unexampled in *Pbleum*: and we are persuaded our able friend last mentioned has for once depended on a less important, and, as it seems, variable mark, in preference to the more essential. The cultivated plant perhaps acquires an inner valve, in consequence of luxuriance. Our opinion of this plant is strengthened by *Alopecurus angustifolius*, Fl. Græc. t. 64, and *lanatus*, Prodr. Fl. Græc. v. 1. 43, which have every character of their genus, and yet are so closely akin to this reputed *Pbleum*, (*Gerardi*), that no greater violence could be done to nature than to disjoin them.

*PBLEUM*, in *Agriculture*, the title of a genus of grasses, some of which have been found useful in the field. It is the cat's-tail-grass.

*PBLEUM Nodosum*, the knotty cat's-tail-grass, which is said by some to be a fine exuberant grass fit for dairy pastures and where cow hay is required, as it affords rich milk, and cows are fond of it; but horses and sheep are said to reject it in favour of the peas, though not in other cases. It is found in the dry hilly pastures in most places.

*PBLEUM Pratense*, the meadow-cat's-tail-grass. This is coarse and late, but answers best in moist soils and situations. When kept well fed down, it is said to be useful on the moist loamy soils where the substratum is of the clayey marle kind. It is asserted to furnish a principal part of the herbage in the meadow lands in America. It affords much feed, and is the plant known by the title of Timothy-grass. It is wholly rejected by some as unworthy of cultivation, though others think well of it.

*PHLIAS*, in *Ancient Geography*, an island situated in the environs of Ætolia.

*PHLIUS*, or *PHLIUNTE*, *Staphilica*, a town of Sicyonia, on the river Asopus, S.W. of Theranda. It was considerable in the time of Paufanias, though it had suffered much during the war of Achaia. In the midst of this place was a brazen goat, to which the inhabitants paid great respect. This worship, without doubt, began, when the country, thinly inhabited, found itself exposed to the destruction and loss of their vineyards by the ravages of the wild goats, with which the mountains abounded. The Phliuans having lost sight of the original institution of this worship, pretended, that the constellation of the goat, or Capra, afforded nourishment to their vines, and that from this circumstance originated the worship of the goat. They pretended that their town was the centre, or "Omphalos" of the Peloponnesus. The town and citadel were adorned with many monuments. Ganymede or Hebe, for these were names of the same divinity, had a temple in this place, which was regarded as a sacred asylum. They had here also a temple of Isis, who was regarded as the protectress of navigation.

*PHLIUS*, a maritime town of the Peloponnesus, in the Argolide, situated between Nauplia Navale and Hermoine. Here were a cavern and a labyrinth. Ptolemy. Strabo.

*PHLOGIDIAUGIA*, formed from  $\phi\lambda\omicron\gamma\iota\zeta\iota\varsigma$ , *I inflame*, and  $\alpha\upsilon\gamma\eta$ , *transparence*, in *Natural History*, the name of a class of inflammable fossils, of a pure texture, and in some degree transparent.

Of this class are the sulphurs, orpiments, zornics, and amber.

They are by this name distinguished from the phlogiferia. Hill.

*PHLOGINOS*, the name of a stone found in Egypt, and called by some *chrystitis*, from its colour resembling gold.

*PHLOGISCIERIA*, derived from  $\phi\lambda\omicron\gamma\iota\zeta\iota\varsigma$ , and  $\sigma\upsilon\kappa\iota\sigma\iota\varsigma$ , *opaque*, the name of a class of fossils, the characters of which are, that the bodies contained in it are inflammable, of a coarse and impure texture, and not pellucid.

The bodies of this class are divided into two general orders, and under those, into five genera. Those of the first order are such as are found loose, and in detached masses: those of the second, such as are found constituting whole strata. The genera of the first order are ambergris, jet, and the asphalta; and those of the second, cannel and common coal.

*PHLOGISTON*, a term given by the old chemists to what was conceived to be the principle of inflammability. Every substance capable of combustion was supposed to consist of a certain incombustible part, called a base, united to phlogiston, and the phenomena of combustion were occasioned only while the phlogiston was present. Sulphuric acid, for instance, was considered as a simple body, which, when united with phlogiston, constituted sulphur. On the other hand, the sulphur, during combustion, lost its phlogiston, and became sulphuric acid. The metals were considered as earths united to phlogiston, while the oxyds were considered as simple bodies. To conceive the true meaning to be given to this imaginary body, we have only to conceive it present where oxygen is absent, and *vice versa*. Nothing more was wanting to shew the fallacy of the phlogistic theory, than weighing the products in which it was supposed to be present. When a body was said to have combined with phlogiston, it became just so much lighter as was equal to the oxygen now to be separated, and the contrary. See *COMBUSTION*.

The process of combustion, to an account of which we have just referred, is unquestionably one of the most striking, as well as the most familiar of natural phenomena. It has for ages engaged, and still engages, the attention of philosophers. We shall endeavour to state, as briefly as possible, the three hypotheses of modern times on the subject. The first is the phlogistic theory of Stahl, which supposes that all inflammable bodies, or such as throw out light and heat during their combustion, contain a portion of substance that is at once intangible and imponderable: this is the phlogiston to which they owe their inflammability. While a body is burning it parts with its phlogiston, which combines with the surrounding air, and by this means it is reduced to an ash, or, if it be a metal, to a calx or oxyd: both the ash and the oxyd differ from the original substances, whether they be wood, coal, iron, &c. in being merely deprived of their phlogiston. Hence, referring to metal for an example, in order to reduce an oxyd to the metallic state, it is necessary to unite it with some inflammable substance, as charcoal, which yields it phlogiston.

The discovery of dephlogisticated air, or oxygen gas, by Dr. Priestley, gave rise to the theory of Lavoisier. This philosopher demonstrated, that in all cases of combustion the inflammable substance united with oxygen, and produced either an acid, an oxyd, or water, or a mixture of the three; and

and that the weight of the product above that of the simple combustible, was equal to the quantity of oxygen that had disappeared. This has been esteemed as an improvement or addition to Stahl's hypothesis, by accounting for the increase of weight of the product of combustion above that of the combustible body. But combustion implies, as we have seen, the disengagement of light and heat, which is accounted for by Lavoisier, to the exclusion of phlogiston, by supposing oxygen gas to be a compound made up of that intangible substance oxygen with heat and light. According to this theory, a body, while in the act of burning, absorbs oxygen from the air, separating it from the heat and light with which it was united, and which escaping, then appears in the separate form of fire. Hence the difference between combustion and slow oxygenation is simply this, that, in the former case, the process advancing rapidly, the heat and light separated from the oxygen gas appear in the shape of flame, and in the latter they escape so slowly, as to be imperceptible to the senses.

There seems scarcely any doubt that the heat given out during combustion is derived from the oxygen gas, because the increase of temperature is found to be accurately proportioned to the quantity of oxygen consumed. There are, however, several objections that oppose the supposition that light is also a constituent part of oxygen gas; of these, one of the strongest is, that the quantity of light given out in the process is not proportioned to the quantity of heat; and the circumstance of the various colours which the flame assumes, according to the nature of the burning body, would lead one to infer that it is the burning body, and not the oxygen gas, which is the principal source of the light. This is the third theory, espoused by M. Gren, Dr. Thompson and others, and according to this, the process of combustion is a double decomposition, in which the combustible body unites with oxygen to form an oxyd, or water, or an acid, according to circumstances, while the light of the combustible body combines with the caloric of the oxygen, and produces flame.

This system bears a resemblance to that of the phlogistic theory, because the one and the other suppose something to be contributed by the combustible body towards the composition of the fire. There are however many difficulties attached to it, that require experiments to explain and confirm. Sir Humphry Davy has indeed, by his investigations, been led almost to conclude that there exists a distinct inflammable principle, which pervades the whole of nature, which would bring us back, in part at least, to the phlogistic theory. See Priestley's Doctrine of Phlogiston established, &c. 1803. Dr. Thompson's System of Chemistry, vol. i.

**PHLOGITES**, in *Natural History*, a name given by Pliny and other authors to a stone, which they say had the appearance of flames of fire, bubbling up and rising to several points within it. It is sometimes called also *phlogonites*.

Some have supposed that the ancients meant no more by this distinction than to express a fire-colour lodged in the stone.

Pliny ranks the phlogites among the gems, but Sabinus and others place it among the larger stones: and we have from some parts of Germany, a spar, with radiations of a fiery red in a white ground, which looks as like flames as any thing one could expect in a stone; but whether this, or some other, be the stone called petrified flames of fire by the collectors of that nation, we are not assured.

**PHLOGONLÆ**, the name of a class of fossils, usually included by authors with many others of a very different kind, under the general name pyritæ. These are defined

to be compound, inflammable, metallic bodies, found in small masses, and of determinately angular figure. Of this class of bodies there are three genera, viz. the *pyrocubia*; the *pyroctagonia*; and the *pyropolygonia*. See PYRITIBIUM, &c.

**PHLOGOSIS**, in *Medicine*, from φλογίζω, to inflame, signifies literally *inflammation*. Sometimes it is employed to denote only the predisposition in the habit to be inflamed, or an inflammatory diathesis, as it is otherwise called; and sometimes it denotes an actual state of inflammation, being synonymous with phlegmon. Dr. Cullen, in his Nosology, makes *phlogosis* a distinct genus, including the varieties of external inflammation, viz. boils, pimples, whitlows, chilblains, &c. which he comprises under two species, *Phlogosis phlegmonæ*, and *P. erythema*. See his Nosol. Method. class i. gen. 7.

**PHLOMIS**, in *Botany*, a name borrowed by Tournefort from the ancient Greeks, when he separated the genus on which he conferred it, from *Verbascum*, with which indeed this genus has little or nothing in common, except woolly leaves. φλομις of the Greeks however is supposed to be our Cowslip or Primrose, and is a diminutive of their φλομις, our *Verbascum*, Mullein, of which last several kinds are distinctly to be ascertained in Dioscorides. The name is scarcely an alteration of φλογιμος, a flame, or burning; and is acknowledged to allude to the use made of the woolly clothing of the Mullein, from remote antiquity, for wicks of lamps. The very same appellation is given by the modern Greeks, not only to the different kinds of *Verbascum*, but also to several species of *Euphorbia*, Spurge. In the latter case, we presume, it applies to the well-known burning or caustic quality of those plants. Though they have no characters or sensible qualities in common with the Mullains, both are used in Greece at present, for the purpose of apparently intoxicating, and thus easily catching, fish. The species of *Verbascum* are supposed to communicate a poisonous or narcotic property to the water; for Dr. Sibthorp records that the fish caught with *Verbascum* soon putrify. The *Euphorbia*, of which another species, the *hiberna*, is put to the same use in Ireland, as we are informed by Dr. Taylor, may be suspected to act in a different manner. Its milk scarcely mixes with water at all. A very few drops will spread instantaneously, in a fine unbroken oily film, over the surface of a large extent of water, and by cutting off the communication of the atmospheric air, must, sooner or later, destroy any fish that has no means of escape. The same application might perhaps kill gnats in their red aquatic state. We are not sure that the profuse mucilage of the *Verbascum* is not more likely to injure fish in this way, by clogging up the water, than the very weak narcotic quality of that genus.—Tourn. t. 82. Linn. Gen. 295. Schreb. 392. Willd. Sp. Pl. v. 3. 117. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 3. 406. Brown Prodr. Nov. Holl. v. 1. 504. Sm. Prodr. Fl. Græc. Sibth. v. 1. 414. Juss. 114. Lamarck Illustr. t. 510. Gærtn. t. 66.—Class and order, *Didynamia Gynnofermia*. Nat. Ord. *Verticillatæ*, Linn. *Labiatæ*, Juss. Brown.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, oblong, with five angles, permanent; its orifice with five acute, nearly equal, spreading teeth. *Cor.* of one petal, ringent, nearly closed; tube cylindrical; upper lip vaulted, incumbent, keeled, compressed, hairy, notched or jagged; lower about the same length, three-cleft, the middle segment largest, heart-shaped, obtuse, the lateral ones smaller and more acute. *Stam.* Filaments four, concealed by the upper lip, two of them longer than the rest; anthers of two oblong divaricated lobes. *Pist.* Germen superior, four-cleft;

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style the length and position of the stamens; stigma cloven, acute, its upper segment shortest. *Peric.* none, except the permanent calyx. *Seeds* four, oblong, triangular.

*Eff. Ch.* Calyx with five angles and five teeth. Upper lip of the corolla incumbent, compressed, bearded, notched; lower about as long, three-cleft; the middle segment largest. Lobes of the anthers divaricated. Upper segment of the stigma shortest.

*Obs.* The Linnæan *Phlomis* is much lessened by the separation of *LEONOTIS* and *LEUCAS* from it, see those articles. What remains is a very natural genus, chiefly inhabiting warm sunny countries in the south of Europe, of which Linnæus knew eight or nine species, and to these a few have been added, either by subsequent discoveries, or by enquiries into what were already published. *Leucas* is almost entirely a tropical genus, and downy or hoary rather than villose or woolly in its habit.

1. *Ph. fruticosâ.* Shrubby *Phlomis*, or Jerusalem Sage. Linn. Sp. Pl. 818. Sm. Fl. Græc. Sibth. t. 563, unpubl. (*Verbascum Matthioli*; Ger. Em. 767.)— $\beta$ . *Ph. latifolia capitata lutea grandiflora*; Dill. Elth. 316. t. 237. *Ph. armeniaca*; Willd. n. 5. (*Ph. orientalis, angustâ et longiore folio, flore luteo*; Tourn. Cor. 10. Herb. Tourn.)—Leaves oblong, obtuse, soft, and densely woolly, crenate. Bractæas lanceolate. Calyx-teeth horizontal. Stem shrubby. Native of dry rocky situations, especially near the sea, in Spain, Sicily, Crete, Greece, and the Archipelago. It has, ever since the time of Gerarde, been a hardy shrub in our gardens, flowering in June and July, and distinguished by its hoary densely woolly aspect, a peculiar soapy scent when touched, and terminal whorls of large, golden, woolly-headed flowers. The stem is usually four or five feet high. Leaves various in size and breadth, obtuse, but by no means "roundish," as Linnæus defines them. Whether the large handsome variety figured by Dillenius, our  $\beta$ , may not be entitled to the rank of a species, we do not feel quite certain. The  $\gamma$  appeared to us, in Tournefort's herbarium, a slight variety only of the common kind, though professor Willdenow has made it a species.—*Ph. fruticosâ* is doubtless the  $\phi\lambda\omicron\mu\iota\varsigma$   $\alpha\gamma\epsilon\iota\alpha$ , or Wild Mullein, of Dioscorides, clearly enough described by him.

2. *Ph. purpurea.* Purple *Phlomis*. Linn. Sp. Pl. ed. 1. 585. Syst. Nat. ed. 10. 1101. Willd. n. 2. Ait. n. 2. Sm. Spicil. 6. t. 7. (*Ph. fruticosa lusitanica, flore purpurascente, foliis acutioribus*; Tourn. Inlt. 178. Barrel. Ic. t. 405.)—Bractæas lanceolate, acute, spinous. Angles of the calyx acute; teeth erect, spinous. Leaves most woolly beneath. Stem shrubby.—Native of Spain and Portugal. Sometimes seen in gardens, where it is a humble hardy shrub, flowering in summer; but the authority of Plukenet for its having been cultivated here about 1661, refers to the following species. Every part is smaller than in the foregoing, and the corolla is of a fine light purple. Leaves resembling those of Sage, especially their upper surface; but the under is more woolly and white. The calyx-teeth are large and spinous, spreading but little.

3. *Ph. italica.* Italian *Phlomis*. Linn. Syst. Nat. ed. 10. 1102. Sm. Spicil. 6. Willd. n. 3. (*Ph. purpurea*; Linn. Sp. Pl. ed. 2. 818, descr. Mill. Ic. t. 202. *Verbascum subrotundo salviae folio*; Bauh. Pin. 240. Pluk. Phyt. t. 57. f. 6.)—Bractæas lanceolate, obtuse, without spines. Calyx abrupt, unarmed. Leaves woolly on both sides. Stem somewhat shrubby.—Native of Italy and Portugal. Frequent in gardens. This was confounded with the last by Linnæus, as  $\alpha$  seems to be in the new edition of Hort. Kew. though distinguished in Donn's Hort. Cant. Nothing

can be more distinct, as the abrupt unarmed bractæas and calyx, and more woolly leaves, abundantly prove. The calyx is correctly drawn by Plukenet. Miller's figure is less exact, and perhaps doubtful.

4. *Ph. Nigfolii.* Niffolian *Phlomis*. Linn. Sp. Pl. 819. Willd. n. 4. Ait. n. 3. Mill. Ic. t. 204.—Bractæas setaceous, minute. Calyx-teeth erect, oblong, obtuse, unarmed. Leaves woolly on both sides; the lower ones deeply heart-shaped; the upper elliptic-lanceolate.—Native of the Levant. Linnæus had it from Arduino. It was cultivated by Miller, and is kept under the protection of a frame at Kew, flowering in June and July. The root is perennial. Stem herbaceous, very woolly, as are the younger leaves, and the calyx. Flowers yellow, in numerous leafy whorls. Bractæas certainly present, though so small and slender as to be buried in the surrounding stellated wool.

5. *Ph. lychnitis.* Lamp *Phlomis*. Linn. Sp. Pl. 819. Willd. n. 6. Ait. n. 4. Sims in Curt. Mag. t. 999, excluding Miller's syn. (*Verbascum angustis salviae foliis*; Ger. Em. 767.)—Leaves linear-lanceolate, hoary; the floral ones dilated at the base. Bractæas setaceous, clothed, like the calyx, with long simple hairs.—Native of Spain, Portugal, and the south of France, on dry open hills. It is rare in our gardens, and kept in the greenhouse, where it blooms about July. The stem is somewhat shrubby. Leaves most hoary beneath; the floral ones gradually shortened, and extremely dilated at their base. Flowers yellow, remarkable for the copious, long, simple, silky hairs, which clothe their bractæas and calyx. When Linnæus wrote that "the flowers are scarcely bigger than the calyx," he seems to have adverted to the floral leaves, which in his specimen are about the length of the flowers.

6. *Ph. crinita.* Thick-leaved Hairy *Phlomis*. Cavan. Ic. v. 3. 25. t. 247. Willd. n. 9.—Leaves heart-shaped, obscurely crenate, densely woolly; floral ones ovate. Bractæas setaceous, clothed, like the calyx, with long compound hairs.—Found by Cavanilles on hills in Spain, growing along with *Ph. purpurea*. The stem is herbaceous. Leaves very thick and woolly on both sides, snow-white, heart-shaped, acute, finely crenate, on longish woolly stalks. Flowers pale orange, in numerous whorls, accompanied by sessile ovate leaves, less densely woolly than the proper foliage. Bractæas and calyx thickly clothed with long, compound, entangled hairs.

7. *Ph. famia.* Samian *Phlomis*. Linn. Sp. Pl. 819. Willd. n. 8. Ait. n. 5. Sm. Prodr. Fl. Græc. Sibth. n. 1378. Fl. Græc. t. 564, unpubl. Venten. Choix, t. 4. Andr. Repof. t. 584. Desfont. Atlant. v. 2. 25. (*Ph. famia herbacea, lunariæ folio*; Tourn. Cor. 10.)—Leaves heart-shaped, crenate, downy beneath. Bractæas in three deep, awl-shaped, spinous segments, the length of the calyx.—Native of Greece and the north of Africa. Miller cultivated it, but his plants were killed by the frost of 1740. Dr. Sibthorp restored this fine plant to the Oxford garden. The root is perennial, and survives our ordinary winters in the open ground. Stem herbaceous, three feet or more in height, erect, straight, quadrangular, hairy. Leaves heart-shaped, dark green and hairy above, more woolly, and paler, beneath; the radical ones span long, on stalks of a still greater length. Flowers dull purple, large, in several dense leafy whorls. Calyx spinous. The deeply three-cleft narrow bractæas constitute an important character. The information of Desfontaines, that the synonym of Tournefort belonged to a very different plant, induced us in the Prodr. Fl. Græc. to transfer that synonym to the next species; but Ventenat has asserted that such information was founded in error, and we here correct our mistake.

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mistake. We are certain of the plant of Linnæus and Sibthorp.

8. *Ph. lunarifolia*. Honefy-leaved Phlomis. Sm. Prodr. Fl. Græc. Sibth. n. 1379; excluding Tournefort's synonym.—Leaves heart-shaped, crenate, downy beneath. Bractæas ovato-lanceolate, undivided, spinous, fringed with tufts of hairs.—Gathered by Dr. Sibthorp in Greece, and on Mount Athos. Like the last in general appearance, but distinguished by its broad undivided bractæas, which are densely fringed with clusters of bristly hairs. Teeth of the calyx rigid and spinous, spreading horizontally. The corolla appears to be yellow.

9. *Ph. biloba*. Cloven Phlomis. Desfont. Atlant. v. 2. 25. t. 127. Willd. n. 10.—Leaves ovate, hoary, nearly entire. Bractæas linear, hairy, as well as the deeply five-cleft calyx. Upper lip of the corolla deeply divided.—Gathered by Desfontaines, near Mayane on Mount Atlas. Root perennial. Stems herbaceous, erect, two or three feet high, woolly, with four obtuse angles. Leaves rugose, ovate, or ovate-oblong, scarcely crenate, clothed with short, branched, hoary hairs; the lowermost stalked. Flowers purple, few together, in numerous leafy whorls. Bractæas very narrow, undivided, clothed with long dense hoary hairs, and about as long as the calyx, which is similarly clothed, and divided half way down, into five upright lanceolate segments. The upper lip of the corolla is compressed, as in all the genuine species of *Phlomis*, but remarkable for being often divided lengthwise to the very bottom.

10. *Ph. pungens*. Needle-pointed Phlomis. Willd. n. 11. (*Ph. orientalis, hormini folio, flore minore, calyce glabro*; Tourn. Cor. 10. *Ph. hormini folio angustiore, subtus incano, flore minori purpurascente*; Amm. Ruth. 41.)—Leaves oblong-lanceolate, ferrated towards the point; rough above; downy beneath; the upper ones entire. Bractæas awl-shaped, deeply three-cleft. Teeth of the calyx horizontal, awl-shaped, pungent.—Native of Armenia, Persia, and Siberia. Root perennial. Stems obtusely quadrangular, purplish, with many opposite leafy branches, clothed with minute starry pubescence. Leaves on short stalks, spreading, two or three inches long, the lower ones only partly ferrated; all green and rough above; clothed with hoary stellated pubescence beneath. Flowers purple, in numerous whorls. Calyx hoary; sometimes rather hairy. Bractæas in three deep awl-shaped segments, like those of *Pb. samia*. Linnæus considered this as not specifically distinct from the following, in which opinion he may possibly be correct, though the breadth, as well as serratures, of their leaves, appear considerably different.

11. *Ph. Herba venti*. Rough-leaved Phlomis. Linn. Sp. Pl. 819. Willd. n. 12. Ait. n. 6. Sm. Fl. Græc. Sibth. t. 565, unpubl. (*Herba venti*; Lob. Ic. 532. *Marrubium nigrum longifolium*; Ger. Em. 701.)—Leaves ovate-oblong, ferrated; rough above; downy beneath. Bractæas awl-shaped, deeply three-cleft, hairy, as well as the stem. Calyx hairy, its teeth awl-shaped, pungent, spreading.—Native of hedges and banks, in Spain, Italy, and the south of France, as well as in Greece and Asia Minor. It is hardy with us, flowering in July and August. The leaves are furnished with numerous close serratures, and their form is ovate, at least at the base. Whole plant larger than the last, and more hairy, especially the bractæas and calyx. The teeth of the latter appear to us scarcely less spreading than in the foregoing. The upper lip of the corolla is considerably cloven.

This is the last of the true and indubitable species of this genus. The following recede somewhat from the proper character, having an oval, not compressed, upper lip, sin-

gularly bristly within, approaching in their corolla, as well as habit, to *LEONURUS*; see that article. They seem however to have the unequal stigma, as well as the proper calyx and bractæas of *Phlomis*.

12. *Ph. laciniata*. Jagged-leaved Phlomis. Linn. Sp. Pl. 819. Willd. n. 7. Ait. n. 8. (*Ph. orientalis, foliis laciniatis*; Tourn. Cor. 10.)—Leaves alternately pinnate; leaflets lacinated. Calyx abrupt, woolly, with spinous upright teeth.—Gathered by Tournefort in the Levant. Miller cultivated it in 1731, but we much fear this handsome plant is lost to our gardens, nor do we any where find a figure of it. The root is either biennial, or perennial. Stem two or three feet high, square, woolly. Leaves chiefly radical, a foot long, nearly smooth, pinnate, deeply but obtusely jagged and toothed, on long stalks. Flowers in numerous, loosely but copiously woolly, whorls. Bractæas linear-lanceolate, with spinous points; they appear to us simple. Corolla large, purple; its upper lip shaggy, lined with dense, straight, shining, parallel hairs, projecting beyond the margins.

13. *Ph. tuberosa*. Tuberous Phlomis. Linn. Sp. Pl. 819. Willd. n. 14. Ait. n. 7. Schkuhr. Handb. v. 2. 160. t. 163. (*Galeopsis maxima, foliis hormini*; Buxb. Cent. 1. 4. t. 6.)—Radical leaves heart-shaped, rough; three-ribbed at the base: floral ones lanceolate, almost entire. Bractæas deeply three-cleft, awl-shaped, bristly. Stem herbaceous, smooth.—Native of fields in Siberia. Buxbaum found it about hedges in Iberia, flowering in June. Miller cultivated this species, and it is marked by Mr. Aiton a hardy perennial, flowering from June to October. The root should seem by the name to be tuberous. Stem a foot high, square, smooth, purple. Radical leaves on long stalks, heart-shaped, acute, strongly crenate, six inches long, and four broad, veiny, roughish; paler beneath; remarkably hollowed out at the base up to the side ribs. Flowers numerous, light purple, in many dense whorls, accompanied by lanceolate, wavy, scarcely crenate, somewhat hastate, smooth, stalked leaves. Bractæas very narrow, rough with horizontal bristles. Calyx slightly angular, smooth, except at the margin and teeth, which last are lanceolate and spreading. Upper lip of the corolla downy, with a toothed or jagged edge, and dense prominent internal hairs. These flowers are but one-third the size of the last.

14. *Ph. alpina*. Alpine Phlomis. Pallas in Act. Petrop. for 1779. v. 2. 265. t. 13. Willd. n. 13. (*Ph. hormini folio, floribus parvis, suave rubentibus, villosissimis*; Amm. Ruth. 39.)—Radical leaves heart-shaped, downy; floral ones lanceolate, ferrated. Bractæas deeply three-cleft, linear-awl-shaped, hairy, as well as the stem.—Native of the Altaic mountains, and various parts of Siberia, in a rich soil, flowering in June and July. Linnæus considered this as not distinct from his *tuberosa*. His specimen wants the radical leaves, but the floral ones are very unlike those of the preceding, being much larger, and very deeply as well as sharply ferrated. The bractæas are somewhat broader, and much more hairy. Flowers large, the edge of their upper lip deeply jagged. The root is said to be fibrous, and the stem sometimes above five cubits high; both very remarkable differences from the humble *Pb. tuberosa*. The downiness of the stem is but slight in our plant, which was gathered by Gerber in the deserts of Tula, Jebz, &c. towards mount Taurus.

PHLOMIS, in Gardening, contains plants of the shrubby and under-shrubby evergreen kinds, of which the species cultivated are; the shrubby phlomis, or Jerusalem sage (*P. fruticoso*); the sharp-leaved purple phlomis (*P. purpurea*); the blunt-leaved purple phlomis (*P. italica*); the sage-

sage-leaved phlomis (*P. lychnitis*); the jagged-leaved phlomis (*P. laciniata*); the tuberous phlomis (*P. tuberosa*); the white phlomis (*P. zeylanica*); the cat-mint-leaved phlomis (*P. nepetifolia*); the narrow-leaved phlomis, or lion's-tail (*P. leonurus*); and the dwarf shrubby phlomis (*P. leonitis*).

There are of the first sort two varieties; the narrow-leaved shrubby phlomis, or Jerusalem sage, which does not rise so high as the other variety; the branches are weaker; the leaves longer, narrower, and rounder; the whorls of flowers smaller; but the flowers of the same shape and colour. These have been long cultivated under the title of French sage, &c.

The broad-leaved shrubby phlomis has a shrubby stalk, sending out branches on every side; the leaves hoary, broader than the former, of an oblong ovate form, on pretty long footstalks, and whiter; the whorls large, with bigger flowers, the upper lip of which is very hairy.

Of the ninth sort there is a variety with variegated leaves.

*Method of Culture.*—All these plants may be increased by layers and cuttings. The two first hardy sorts in particular grow freely by the first method; the young branches should be chosen, and laid in the common way, any time in autumn, spring, or summer; when they readily strike root, and commence proper plants by the autumn following, when they should be planted where they are to grow.

The cuttings should be made from the young shoots in spring and summer, being planted in a shady border, giving plenty of water in dry weather; when many of them will take root, and make good plants by the autumn following. The cuttings of the greenhouse kinds should, when made in the spring, be planted in pots, in order to be continued in shelter until May; or if the pots be plunged in a hot-bed, it will greatly forward their rooting; though, when the young shoots are planted in June or July, in a bed or border of rich earth, many of them take root, but may be much forwarded if covered down close with hand glasses, removing the glasses when the cuttings begin to shoot.

The fifth may likewise be increased by slips planted at the same time; and the sixth by offsets. The seventh should be preserved in the bark-stove.

These are all very ornamental plants in the borders, greenhouse, and stove collections, according to the kinds.

**PHLOMON STEPHANOMATICOS**, in the *Botanical Writings of the Ancients*, a name given to the common white mullein. The upper part of the thyrsus, or spike of flowers of this plant, was frequently used in the garlands and coronæ of the ancients; and it is named by Dioscorides and others among the yellow flowers in general use on that occasion.

**PHLORGIA**, in *Ancient Geography*, a town of Africa, in Mauritania Cafariensis. Ptolemy.

**PHLOX**, in *Botany*, an American genus of plants, on which Linnæus has, apparently with great impropriety, bestowed an ancient Greek name. Nevertheless, the allocation of ideas which seems to have induced this measure, may well excuse it. The *σός* of Theophrastus is supposed by Dodonæus to be the *Viola tricolor*; but moll critics have referred it to some kind of *Lychnis*, or *Agrostemma*; and the name, which is synonymous with *flame*, has been imagined to allude to the bright or fiery hue of the flowers. A recent French author, De Théis, even asserts that the appellation in question was given, by modern botanists, to the genus that now bears it, on account of the flame-colour of one of its species. For this we find no authority. The genus was termed *Lychnidea* by Plukenet and Dillenius, because of its resemblance to *Lychnis*. But a name so constructed being against rule, Linnæus

evidently took up the idea of *λυχνίς*, as alluding either to the shape or to the wick of a lamp, (see *LYCHNIS* and *PHLOMIS*), and adopted *Phlox* as a word nearly expressive of the same thing.—Linn. Gen. 86. Schreb. 115. Willd. Sp. Pl. v. 1. 839. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 1. 324. Juss. 136. Lamarck Illustr. t. 108. Michaux Boreal-Amer. v. 1. 142. Gærtn. t. 62.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Rotacea*, Linn. *Polemonia*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, with five angles, and five deep acute teeth, permanent. *Cor.* of one petal, falver-shaped: tube cylindrical, longer than the calyx, contracted downwards, incurved; limb flat, in five deep, equal, obtuse segments, shorter than the tube. *Stam.* Filaments five, capillary, within the tube of the corolla, two of them longer, and one shorter, than the rest; anthers in the throat of the corolla. *Pist.* Germen superior, conical; style thread-shaped, the length of the filaments; stigma in three acute segments. *Peric.* Capsule ovate, with three angles, three cells, and three valves. *Seeds* solitary, ovate. *Recept.* central, large, with three prominent angles.

Ess. Ch. Corolla falver-shaped. Stamens unequal. Stigma three-cleft. Calyx prismatic. Capsule of three cells. Seeds solitary.

A handsome tribe of hardy, perennial, herbaceous, entire-leaved plants, valuable in our gardens for their copious showy flowers, which are adorned with various hues of purple or pink, and in one instance are of a brilliant white. The 14th edition of Linn. Syst. Veg. contains ten species. Willdenow has twelve; the recent edition of Ait. Hort. Kew. fourteen. All, except *Ph. fibrica*, are natives of North America, and, as far as we know, of no other country.—Michaux has ten species only in his *Flora*, and three of those are not cited by the above authors. He calls them *triflora*, *latifolia*, and *aristata*. They are each probably referrible to some one or other known species, though we cannot precisely ascertain to which they belong. The following examples will suffice.

*Ph. paniculata*. Great Common Phlox, or Panicked Phlox. Linn. Sp. Pl. 216. Willd. n. 1. Ait. n. 1. Mill. Ic. t. 205. f. 2. (*Lychnidea folio falcinico*; Dill. Elth. v. 1. 205. t. 166. f. 203.)—Leaves lanceolate, flat, rough-edged. Stem smooth. Corymbs panicked, dense, many-flowered. Segments of the corolla rounded.—Native of North Carolina. Cultivated in the Eltham garden in 1732, and now common in every border and shrubbery, flowering in August. It requires frequent supplies of water to appear to advantage; but in a favourable soil the stems are three or four feet high, crowned with immense close tufts of innumerable blossoms of a fine lilac hue, without scent, which continue in beauty for above a month.

*Ph. suaveolens*. White Phlox. Ait. Hort. Kew. ed. 1. v. 1. 206. ed. 2. n. 3. Willd. n. 3.—Leaves ovate-lanceolate, smooth in every part. Stem very smooth. Cluster panicked.—Introduced from North America about 1766, by the celebrated P. Collinson. It is an elegant hardy perennial, requiring rather a moist soil to be lasting, and flowering in July or August. The root is somewhat creeping. Stems but half the height of the former, and the flowers much less numerous, though larger. Their delicate fragrance, and pure brilliant whiteness, render the plant very desirable. The flower-stalks are finely downy, as in the former.

*Ph. pyramidalis*. Pyramidal Phlox. Donn. Cant. ed. 5. 39. Ait. n. 5. Sm. Exot. Bot. v. 2. 55. t. 87. (*Lychnidea mariana*, &c.; Pluk. Almag. 122.)—Leaves ovate or heart-shaped,

shaped, pointed, smooth. Stem rough. Flowers in a dense pyramidal cluster. Calyx-teeth nearly straight.—Introduced from North America by Messrs. Lee and Kennedy, before the year 1800. The purple-spotted stem, and dense pyramidal cluster of rich purple honey-scented flowers, render this a very ornamental species. We suspect it to be what is figured in Jacq. Hort. Vind. v. 2. t. 127, for the Linnæan *maculata*, a more slender and narrow-leaved species, frequent in gardens, distinguished by the recurved teeth of its calyx. Miller sent Linnæus a specimen of our *pyramidalis*, with the above synonym of Plukenet, and perhaps had the plant growing.

*Ph. divaricata*. Early-flowering Phlox. Linn. Sp. Pl. 217. Willd. n. 8. Ait. n. 9. Curt. Mag. t. 163. Mill. Ic. t. 205. f. 1.—Leaves broadly lanceolate; the uppermost alternate. Stem divided. Flower-stalks in pairs.—This pretty species was introduced in Miller's time, and still continues to ornament the Chelsea garden profusely, flowering in May. We believe it requires, like the rest of the genus, a rather moist soil, and hence is not so well calculated, as has been supposed, to adorn rock-work. The stem is about a foot high, roughish, as well as the leaves. Flowers distinguished by a peculiar light, but brilliant, greyish-blue; the buds being of a violet hue. The segments of the corolla are inversely heart-shaped, tapering at their base.

*Ph. stolonifera*. Creeping Phlox. Sims in Curt. Mag. t. 563. Ait. n. 11. (Ph. reptans; Michaux Boreal-Amer. v. 1. 145. Vent. Malmaison. t. 107.)—Scyons creeping. Leaves obovate, somewhat spatulate.—Found by the late Mr. J. Frazer in Georgia. Michaux says it grows on lofty mountains, in the western part of Carolina. It is supposed to be hardy, flowering from June to September, and was expected to prove a valuable plant for rock-work; but whether for want of due supplies of water, or from any other cause, we have not found it lasting. The copious rough leafy shoots from the root trail and throw out radicles in every direction. From the crown arises an erect stem, a span high, bearing a cymose panicle, of several handsome deep-blue flowers, with orange anthers.

*Ph. ovata*. Ovate-leaved Phlox. Linn. Sp. Pl. 217. Willd. n. 9. Ait. n. 12. Curt. Mag. t. 528. (Lychnidea fistulosa marilandica, clinopodii vulgaris folio, flore amplo singulari; Pluk. Mant. 122. Phyt. t. 348. pl. 4.)—Radical leaves ovate, acute, somewhat fleshy, smooth; stem-leaves ovato-lanceolate. Corymbs level-topped.—Sent by Peter Collinson to Linnæus, who by a strange inadvertency described the flowers as solitary. To this he seems to have been led, rather by an attention to Plukenet's starved figure, than to his own specimen, in which latter they are abundant. This is one of the handsomest species, and distinguished by its thick smooth ovate leaves, of which the uppermost, often narrower than the rest, assume a likeness to those of Privet. The calyx-teeth have taper points. The corolla is large, of a fine purple, externally pale. We have never seen it of so rich a crimson as is exhibited in the Botanical Magazine.

*Ph. setacea*. Fine-leaved Phlox. Linn. Sp. Pl. 217. Willd. n. 12. Ait. n. 14. Curt. Mag. t. 415. (Lychnidea, &c.; Pluk. Phyt. t. 98. f. 3.)—Leaves awl-shaped, slender, smooth; fringed at the base. Flower-stalks elongated.—Native of Carolina, from whence Mr. Frazer brought plants in 1786. It flowers in April and May, but requires the protection of a frame in winter. The long weak stems require support; they are slightly hairy, clothed with numerous slender shining leaves, like those of a *Stellaria*. Flowers at the ends of the branches, on long slender hairy stalks. Corolla of a beautiful light purple, with a dark eye, the segments jagged at the end.

This and the other slender-leaved species, *subulata* and *sibirica*, are nearly akin, but the latter, at least, is clearly distinct. We have never seen it but in the Linnæan herbarium.

*Ph. pinnata*. Cavan. Ic. v. 6. 17. t. 528. f. 1, sent by the author, appears to us rather an *Ipomopsis*; see that article. The pinnate leaves, and the membranous calyx, do not accord with *Phlox*.—*Ph. linearis*, t. 527 of the same work, is very like the Linnæan *pilosa*.

PHLOX, in Gardening, comprises plants of the herbaceous, fibrous-rooted, showery, perennial kind, of which the species cultivated are; the paniced lychnidea (*P. paniculata*); the white-flowered lychnidea (*P. suaveolens*); the spotted-stalked lychnidea (*P. maculata*); the hairy-leaved lychnidea (*P. pilosa*); the Carolina lychnidea (*P. carolina*); the smooth lychnidea (*P. glaberrima*); and the early-flowering lychnidea (*P. divaricata*).

*Method of Culture*.—These are generally increased by parting their roots, as they do not often produce seeds in this climate. The best time for performing this is in autumn, when the stalks begin to decay. The roots should not, however, be divided into too small heads, when they are expected to flower well the following summer; nor should they be parted oftener than every other year, as, when they are too often removed and parted, it greatly weakens the roots, so that they send out but few stalks, and those so weak, as not to rise their usual height, and the bunches of flowers are much smaller.

The large root offsets may be planted out at once where they are to remain; but the small ones in nursery-rows, for further increase in size. As soon as the roots are parted and removed, it is a good way to lay some old tan, or mulch, upon the surface of the ground about their roots, to prevent the frost from penetrating; for, as they will have put out new roots before winter, the frost, when it is severe, often kills the fibres, whereby the plants suffer greatly, and are sometimes wholly destroyed.

The first and sixth sorts may be increased pretty expeditiously by their spreading roots, but the others but slowly this way; of course it is a better method to have recourse to cuttings. The best season for planting the cuttings is about the end of April, or the beginning of the following month, when the young shoots from the roots, which are about two inches high, should be cut off close to the ground, and their tops shortened, being then planted on a border of light loamy earth, and shaded from the sun until they have taken root; or if they are planted pretty close together, and covered with bell or hand-glasses, or in pots, shading them every day from the sun, they will put out roots in five or six weeks; but on their beginning to shoot, the glasses should be gradually raised to admit the free air to them, otherwise they are apt to draw up weak, and soon spoil: as soon as they are well rooted, the glasses should be taken off, and the plants inured to the open air; being soon afterwards removed into a bed of good soil, planting them about six inches distance every way, shading them from the sun, and watering till they have taken new root; after which, when kept clean from weeds, they require no other care till autumn, when they should be removed into the borders or other parts, where they are designed to remain.

When some of the plants are put into pots, and sheltered under a hot-bed frame in winter, they flower stronger the following summer.

These plants succeed best in a moist, rich, mellow soil, growing taller, and flowering more strongly, and in larger bunches. In poor dry soils they often die during the summer, when not constantly watered with care.

Some of the plants afford ornament in the borders, clumps, and other parts of pleasure grounds; and those planted into pots to be placed in court-yards, or other places near the habitation, when they are in beauty, and being mixed with other flowers, are highly ornamental, having a fine effect.

**PHLYACOGRAPHIA**, formed from *φλυαζειν*, to *trifle*, or *φλυαξ*, *trifler*, of *φλυα*, among the *Ancients*, a merry and burlesque imitation of some grave and serious piece; particularly a tragedy travelled into a comedy.

The phlyacographia was the same thing with the *bilarodia*, or *bilarotragedy*.

There were several kinds of phlyacography, which had their several names. See Salmasius on Solin.

The parodies which have been made of some parts of the best poets, as the Virgil Travetty of Scarron and Cotton; the Rival Queens of Cibber, from the Rival Queens of Lee; and some pieces of operas, the music of which is applied to low and ridiculous words, are comprehended under the notion of phlyacographies.

**PHLYCTÆNÆ**, *φλυκταναί*, in *Medicine*, and sometimes *Phlystana*, from *φλυα*, *I am hot*, seem to have signified, in the writings of the ancients, all small, inflamed elevations of the skin, containing a fluid, such as pustules, vesicles, blains, &c. By the translators of the Greek writers, the term is generally rendered *pustules*. *Phlyctæne* are now, however, generally considered to be *vesicles*, that is, small elevations of the cuticle, containing a *watery* fluid, and not *pus*. Hippocrates speaks of phlyctæne in one or two places, as containing a thin sanious humour, of an acrimonious quality. (Progn. ii. 60. Epid. l. ii. sect. i. 5.) And some writers have called those vesicles only phlyctæne, which have a livid base.

**PHLYCTÆNÆ** also denote little ulcerous vesicles, arising sometimes on the adnata, and sometimes on the cornea of the eye, like so many little bladders full of water: they are popularly called *blisters in the eyes*.

They appear like grains of millet; and, when produced by a sharp corroding humour, occasion violent pain: the pustules on the adnata are red; those on the cornea are blackish, if near to the surface; but whiter, if deeper. They are cured by discutients and driers.

**PHLYCTIS**, more commonly used in the plural, *phlyctides*, from the same root, signifies smaller vesicles, which usually cluster together upon a circular inflamed base, the contained serum being sometimes clear and pellucid, and sometimes milky, whey-like, or pearl-coloured.

**PHLYSIS**, a term used by the ancients to express an eruption on the skin, from a redundancy of humours.

**PHLYSTÆNÆ**. See **PHLYCTÆNÆ**.

**PHLYZACIUM**, *φλυζακίον*, from *φλυα*, or *φλυζε*, *serve*, *ebullire*, to be hot, or to bubble, a hot and inflamed pustule on the skin. (See Celsus, De Medicinâ, lib. v. cap. 28. § 15.) In attempting to establish a more definite nomenclature for the diseased appearances of the skin, Dr. Willan appropriated the term *phlyzadium* to one of four varieties of pustules, and defined it in these words: "a pustule commonly of a large size, raised on a hard circular base, of a vivid red colour, and succeeded by a thick, hard, dark-coloured scab." See Willan on Dif. of the Skin, p. 1; and Bateman's Practical Synopsis of Cutan. Diseases, p. xxi.

**PHOBEROS**, in *Botany*, *φοβερό*, *formidable*, in allusion to the thorns.—Loureir. Cochinch. 317.—Class and order, *Icosandria Monogynia*. Nat. Ord. . . .

Gen. Ch. *Cal.* Perianth inferior, permanent, in ten ovate, concave, spreading segments; five alternate ones twice the size of the others. *Cor.* none. *Stam.* Filaments near 100,

capillary, inserted into the base of the calyx, longer than its segments; anthers very small, nearly ovate. *Pist.* Germen superior, roundish; style thick, the length of the stamens; stigma thickish. *Peric.* Berry ovate, fleshy, smooth, of one cell. *Seeds* about four, nearly ovate.

Ell. Ch. Calyx inferior, in ten segments. Corolla none. Berry of one cell, with about four seeds.

1. *Ph. cochinchinensis*. Lour. n. 1.—Whole stem prickly. Flower-stalks terminal.—Native of Cochinchina, where it forms impervious hedges. *Stem* shrubby, woody, ten feet high, erect, covered with long, straight, awl-shaped, axillary, solitary prickles. *Leaves* alternate, ovate, flat, hard, smooth, somewhat serrated. *Stalks* terminal, each bearing many white flowers.

2. *Ph. chinensis*. Lour. n. 2.—Lower branches prickly, barren; upper unarmed, flowering.—Native of China, where hedges are made of it, like the foregoing. *Stem* shrubby, woody, erect, eight feet high. *Branches* spreading; the lower ones only armed with long, straight, mostly solitary prickles. *Leaves* partly scattered, partly opposite, stalked, ovate, entire, flat, smooth. *Flowers* pale, many together, on lateral stalks, from the upper branches. *Berry* fleshy, small, ovate, with few seeds in its solitary cell.—Such is Loureiro's account, the only information we have respecting these plants. He cites under the 2d *Oxyacantha javanica*; Rumph. Amboin. auctuar. 39. t. 19. f. 3. This author speaks of the fruit as unwholesome, causing vertigo, and the wounds caused by the thorns are said to be dangerous. The plant serves for hedges in Java. Rumphius mentions a species or variety with longer spines, which makes formidable walking-sticks for those who go abroad by night.

**PHOBOS**, **FEAR**, in *Mythology, was personified by the Greeks, and represented with the head of a lion. See **FEAR**.*

**PHOCA**, the *Seal*, in *Zoology*, a genus of the class and order *Mammalia Fera*. The generic character is as follows: the fore-teeth are acute; the six upper teeth are parallel, the outer ones are larger; the lower six are parallel, distinct, equal, and rather obtuse; the tusks are twice as long, acute, robust, solitary, the upper are remote from the fore-teeth, the lower form the grinders. There are five or six grinders which are narrow and tricuspidate. There are nineteen species, besides varieties. This is a dirty, quarrelsome tribe, easily tamed, and polygamous; the flesh is succulent, tender, and fat; the skin is useful; the animals inhabit and swim under water; they crawl on land with difficulty, because of their retracted fore feet, and united hind feet; they feed on fish and marine productions, and swallow stones to prevent hunger, by distending the stomach.

#### Species.

**URSINA**; *Ursine Seal*. The specific character of this is; head with external ears. It inhabits Kamtschatka, New Zealand, and the adjacent islands; swims impetuously in large families; copulates on shore; is fearless, biting at whatever is thrown at it; the old ones live by themselves, and grow very fat; each has a peculiar flone for its bed, which it never deserts; the males fight fiercely for their females and stations; their combat is single and fair, two never fighting against one; when grieved it sheds tears abundantly. This is one of the larger seals, growing to the length of eight feet, and weighing seven or eight hundred pounds. The female is much less. Though they lie by thousands on the shore, each family keeps itself separate from the rest, and is sometimes so numerous as to amount

## PHOCA.

amount to above an hundred. Urfine seals are seen from June to September, during which time they breed and educate their young. In September they quit their stations on the islands, and return, some to the Asiatic, and some to the American shore; but are generally confined to a space in those seas between lat.  $50^{\circ}$  and  $56^{\circ}$ . They are so tenacious of life, as to live a fortnight after receiving such wounds as would instantly destroy almost any other animal.

**LEONINA**; Bottle-nosed Seal. The body of this is brown; the head is crested on the fore part. It has two teeth in the lower jaw, a little projecting; the eyes are large; the whiskers white, annulate with red; all the feet are palmate; and there are five toes on each, with nails growing out behind the tip; hind feet stretched back; with a tail between, two inches long. There is a pretty good specimen of this species in the British Museum, which formerly belonged to the Royal Society. It inhabits the seas about New Zealand, the island of Juan Fernandez, and the Falkland islands. During the breeding season they are seen in great numbers attending their young on the shore; they bring two young at a birth: the females are excessively fierce during the time of rearing their young; towards evening both the male and female swim out a little way to sea, the female bearing the young on her back, which it is said the male frequently pushes off, in order to oblige them to essay their swimming powers. On the arrival of these animals on the breeding islands, they are said to be so excessively fat as to resemble skins of oil; the tremulous motion of the blubber being plainly perceivable beneath the skin. A single seal of this species has been known to yield a butt of oil, and to be so full of blood, that what has run out has filled two hogheads. The flesh is eatable.

**JUBATA**; Maned Seal. The neck of the male is covered with a mane of loose floating hair. It is of a reddish colour; the young more dusky, in the female more vivid; it is larger than the *P. leonina*, being about twenty-five feet long, and sometimes weighing 1600lbs. The animals of this species inhabit the Penguin and Seal islands, near Cape Desire, on the coast of Patagonia, and are found within the Magellanic straits, and on the Falkland islands, but they have not been discovered in any other part of the southern hemisphere, or in any other place nearer than the sea between Kamtschatka and America. They live in families distinct from the Urfine and other seals, though their manners are nearly the same. The males utter a snorting sound, and occasionally roar like bulls; the voice of the females resembles that of calves, and the young bleat like lambs.

**VITULINA**; Sea Calf. The head of this species is without ears; the neck is smooth; the body is brown. There are three other varieties.

(1) *Botnica*, in which the nose is broader; the claws longer; the colour more obscure.

(2) *Sibirica*; colour silvery. It inhabits the lakes of Baikal and Oron.

(3) *Caspica*; the colour of this is various.

Whiskers undulate; the eyes have a nictitant membrane; the crystalline humour is globular; the tongue is bifid. The legs are so very short as to be scarcely perceptible; and the hinder ones are so placed as to be only of use to the animal in swimming, or but very little to assist it in walking; being situated at the extremity of the body. When these animals collect together in great numbers on the shore, they diffuse a very strong and disagreeable smell, a fact that is noticed by Homer, who represents Menelaus

relating his adventure on the isle of Pharos, where he was constrained to lie for a time among a flock of seals, disguised in the skin of one of these animals. The structure of the seal is so singular, that, as Buffon observes, it was a kind of model on which poets formed their tritons, sirens, and sea-gods, with a human head, the body of a quadruped, and the tail of a fish. The seal is possessed of a considerable degree of intelligence, and may be tamed, so as to become perfectly familiar with those to whose care it is committed; and even to exhibit tricks and gesticulations. The seal is supposed to be a very long lived animal. Like other quadrupeds, they have various inflexions of the voice, according to the passions with which they are inspired. They are said, however, to differ from them in this, that they delight in thunder storms, and at such periods to sit on rocks and contemplate with seeming delight the convulsions of the elements.

**MONACHUS**; Hooded Seal. Head without ears; there are four fore-teeth in each jaw; the fore feet are undivided; the hind feet without nails. This species has obtained the name of Monachus, or cowed seal, from the looseness or width of the skin behind the neck, which, when the animal is placed on its back, folds like a monk's cowl. It inhabits the Mediterranean, about the coast of Dalmatia, growing to the length of more than eight feet. The head is small, the neck longer than that of the common seal; the orifices of the ears not larger than a pea; the hair is short and rude; the colour is dusky, spotted with ash-colour; the toes on the fore feet have nails; but the hind feet resemble fins, and have no nails. This species is fully and accurately described in the 4th vol. of the Berlin Transactions.

**GRENLANDICA**; Harp Seal. Head smooth, without ears; body grey; a lunulate black mark on the sides. It inhabits Greenland and Newfoundland; it is highly esteemed on account of the excellence of its skin, and the quantity of oil which it yields.

**HISPIDA**; Rough Seal. Head smooth without; body pale brown, rough, with bristly hairs. It inhabits Greenland and Labrador, feeds on shrimps and small fish; it often sleeps on the surface of the water; the flesh is red and nauseous; it is only about four feet long. A variety is much larger, and weighs perhaps 500lbs.

**CRISTATA**; Crested Seal. Head on the fore part crested; body grey. This species is also distinguished by a strong folded skin on the forehead, which it can at pleasure draw over the eyes and nose, to defend them against the stones and sands raised and scattered in stormy weather. Its hair is white, with a thick coat of black woolly hair beneath, which makes the animal appear of a fine grey. It is found only on the southern parts of Greenland and Newfoundland; and in the latter it is called the hooded seal.

\* **BARBATA**, or Great Seal. Head smooth, without ears; the body is blackish. This is similar to the common seal, but grows to about the length of twelve feet, it having been shot in the north of Scotland of that size. Even when so young as to be without teeth it is upwards of seven feet long, whereas the common seal is at its full growth when it has arrived at the length of six feet. It is found in the northern seas. The skin, which is thick and very strong, is used by the Greenlanders for thongs for their seal fishery. The young ones, when first brought forth, are quite white.

**PUSILLA**; Little Seal. Head smooth, with the appearance of ears. It inhabits the Mediterranean sea, Chili, and Juan Fernandez, and is about twenty-eight inches long.

**CHILENSIS.** Snout and ears longish, toes five on each foot. It inhabits about the coast of Chili.

**MUTICA;** Long-necked Seal. Body slender, without claws on the fore feet.

**AUSTRALIS.** Ears short and pointed; the body is cinereous; hairs tipped with dirty-white; nose set with strong, black bristles; the upper fore-teeth are transversely furrowed; the lower longitudinally; tusks with a smaller secondary tooth on each side; grinders conic, with a small process on one side near the base.

**TESTUDO;** Tortoise Seal. Head resembling a tortoise; neck slender. It is said to inhabit many European shores; the species is, however, but little known.

**FASCIATA;** Ribbon Seal. Body blackish; neck, side, and haunches with yellow stripes resembling harness. It inhabits the Kurile islands, and is covered with short, fine, glossy, black hair.

**LANIGER;** Leporine Seal. It has four fore-teeth in each jaw; the upper lip is thick, with long thick whiskers; the fur is soft and uneven; the feet have nails, and its length is about six feet and a half. It inhabits the White sea, Iceland, and the Frozen ocean.

**PUNCTATA;** Speckled Seal. Body, head, and limbs speckled. It inhabits the seas of Kamtschatka, and the Kurile islands.

**MACULATA;** Spotted Seal. Body spotted with brown. It inhabits the Kurile seas, and is very scarce.

**NIGRA;** Black Seal. Hind legs peculiarly formed. It is found on the coasts of the Kurile seas; but the structure of its legs has not been accurately ascertained.

Dr. Parsons derives the generic name *phoca*, from *φωκ*, or, according to Dr. Charleton, from *βωκ*, signifying a noise or kind of grunting made by these animals. He also reduces to this genus the *manati*, the *foal* or *seal*, and the *walrus* or *morse*. Phil. Transf. vol. xvii. 109, &c.

**PHOCÆA,** in *Ancient Geography*, a town of Asia Minor, belonging to the Ionians, situated on the southern coast of the gulf of Cumæ, N. of the mouth of the Hermus. It had two ports. Its inhabitants had a very extensive commerce along the Mediterranean; and they founded several colonies, and among others that of Marseilles.

**PHOCÆNA,** or **PORPESSE.** See **DELPHINUS.**

**PHOCAIS,** in *Ancient Geography*, a territory of Asia, towards the mouth of the Caicus, on the coast of Mitylene, according to Thucydides.

**PHOCARIA,** an island of the Ægean sea, upon the coast of Attica. Pliny.

**PHOCARUM INSULA,** an island on the coast of Arabia. Strabo.

**PHOCAS,** in *Biography*, Roman emperor of the East, was a centurion in the army on the Danube at the time of the revolt from the emperor Maurice, A. D. 602, nor is it at all known how he came to be elected emperor; but probably from his becoming a leader in some sedition. On the intelligence of this revolt, the people of Constantinople broke out in an insurrection, and Maurice was obliged to retire into Asia. Phocas soon after entered the capital, and with his wife was crowned by the patriarch. At the public games which he exhibited on the occasion, a tumult arose, in which he was reminded with threats that Maurice was still alive. The death of that unfortunate emperor, with that of his five sons, soon followed. The reign of the infamous Phocas was full of bloodshed and cruelty, so that he has been justly ranked among the most detestable of tyrants. At length he became an object of terror to his own son-in-law, Priscus, who entered into a correspondence with Heraclius, exarch of Africa, for the purpose of ef-

fecting a revolution. Phocas was, by the arts of Priscus, kept ignorant of his danger till it was too late for effectual opposition. Deserted by his guards and domestics, he was seized in his palace, stripped of his imperial robes, and carried to the galley of Heraclius, who had been proclaimed emperor. After suffering a variety of insults and tortures, his head was cut off and his body committed to the flames, A. D. 610, in the eighth year of his reign. Univer. Hist. Gibbon.

**PHOCEAS,** in *Ancient Geography*, a town of Sicily, in the territory of Leontium. Thucydides.

**PHOCENSES,** a people of Greece, between Ætolia and the isthmus of Corinth.—Also, a people of Phocæa, and also of Italy, in Etruria. Strabo.

**PHOCION,** in *Biography*, an Athenian commander, one of the most virtuous characters of antiquity, was of humble descent, but received a liberal education, and imbibed under Plato, and other philosophers, those elevated principles of conduct which governed his whole life. As he wished to serve his country equally in council and the field, he cultivated the talents adapted to both. He first served under Chabrias, a distinguished commander, but of an impetuous temper. Phocion gained his esteem and moderated his violence. He contributed to the naval victory near Naxos, in the year 377 B. C.; and being afterwards sent in a single vessel among the islands to demand their contributions, he conducted himself with so much prudence, that he brought back with him all the ships and money at which they were assessed. In the war with Philip of Macedonia he obtained a complete victory, and on this occasion he gave a signal proof both of his wisdom and humanity. Before the battle he freely suffered those to depart who had no inclination to fight, lest their cowardice in action should disconcert the rest; and after the victory he released his prisoners, knowing the danger they would incur if brought to Athens, from the violence of the populace. Phocion, though an able general, was the habitual friend of peace. He was too well apprized of the unstable character of the Athenian democracy, and the talents and resources of Philip, not to be convinced that a protracted war must be fatal to his country; hence he was the constant opposer of those orators, who never ceased to urge the people to hostilities, and to discountenance all proposals for accommodation. The pure patriotism and integrity of Phocion were founded on their only solid basis, contentment with a little. Amidst the highest honours, his mode of living was as simple and frugal as that of any common citizen. He possessed a little farm, and was not ashamed to perform domestic offices with his own hands. He had a wife who was a worthy partner of his virtues, and placed her glory in his reputation. An Ionian lady once making a display before her of all her jewels and other finery, "My ornament," said the matron, "is my good man Phocion, who is now called for the twentieth time to the command of the Athenian armies." When the people of Megara were privately meditating an union with the Athenians, Phocion zealously promoted the measure; and, assembling a body of volunteers, marched thither, and was joyfully received; and having rebuilt its walls, left it in a state of security, as a valuable accession to the strength of Athens. When Philip entered Phocis, with the intention of invading Attica, Phocion not confiding in the alliance with the Bœotians meditated by Demosthenes, was desirous of an accommodation; but he was over-ruled, and the fatal battle of Cheronea proved the justness of his apprehensions. The death of Philip was celebrated with great rejoicings at Athens by Demosthenes and his party, but Phocion discouraged such indecorous triumph, and

and bid them remember that the victors at Cheronea were diminished only by one man. In the same spirit of avoiding new hazards he disapproved of the contemptuous speeches relative to young Alexander, and the attempts to form a confederacy against the Macedonian power. At length, after a long life spent for the advantage of his country, he was for an error in judgment accused of treason. The populace shewed the greatest exasperation against him, and would scarcely suffer him to speak. At length, obtaining an interval from clamour, he cried, "Athenians, I confess the crime charged against me, and submit to the sentence of the law; but what have these innocent men (pointing to some involved in the same punishment) done to deserve death." The cry of the people was, "They are your friends, and that is enough." The decree was then passed adjudging them all to die, and some even proposed a clause for putting Phocion to the torture. The aged patriot, unmoved amidst the lamentations of his friends and fellow sufferers, was led away, even his enemies admiring the serenity of his demeanour. The popular indignation against him denied his body a funeral in his own country, and it was carried by a slave and burnt in the territory of Megara. A matron with her maid attended on the obsequies, and raising an humble monument on the spot, collected his ashes, and deposited them under her own hearth, praying the household gods to protect them till they should be restored to the sepulchre of his ancestors, when the Athenians should have recovered their senses. This event took place; and his countrymen repenting the wrong they had done him, brought home his ashes at the public expence, erected a brass statue to his memory, and punished with death his accusers. This event occurred in the year 318 B. C. Plutarch. Univer. Hist.

PHOCIS, the *Phocide*, in *Ancient Geography*, a country of Græcia propria; which extended from the N.W. or the Doride to the S.E., where it touched Bœotia, and to the W. bordering on the Ozole Locrians, to the S.W. as far as the gulf of Corinth, and to the N.E. where were the Opontian Locrians and the Epienemidian Locrians. Although it was watered by many streams, it formed from the N.W. to the S.E. an extensive valley, in the middle of which flowed the Cephissus. Its other principal rivers were the Pindus and the Cachalis. The chief mountain was Parnassus, where were Delphi and the Castalian fountain. The most considerable places were Delphi (Castri), Crissa, Anticyra (Aspro-Spiria), and Elatia (Turco-Chono), the most considerable of the towns in the Phocide. The Phocæans, according to Pausanias, derived their name from Phocus of Corinth, or from Phocus the son of Æacus, who came to this country with the Æginetæ, who made themselves masters of it, and gave it the name of the Phocide. Pausanias mentions several military expeditions of the Phocæans, *viz.* their concurrence in the siege of Troy; their war against the Thessalians, in which they gained great honour; and their participation in what was called the sacred war, in which Philip of Macedon took a part. The Phocæans were ultimately excluded from the council of the Amphictyons.

PHOCLIS, a town of Arachofia, between Axola and Aricara. Ptolemy.

PHOCRA, a mountain of Africa, in Mauritania Tingitana, which, according to Ptolemy, extended from the lesser Atlas to the promontory Byladium.

PHOCUSSA, or PHACUSSA, an island of the Ægean sea, and one of the Sporades, according to Pliny and Steph. Byz.

PHŒBEUM, a place of the Peloponnesus, in Laconia, in the environs of Sparta. Livy.

PHŒBI PROMONTORIUM, a promontory of Africa, in the Iberian sea, between Jagath and Alyba-Colauna. Ptolemy.

PHŒBIA, a town of Greece, in the Peloponnesus, which, according to Pausanias, belonged to the Sicyonians.

PHŒBUS, in *Mythology*, a name given to Apollo.

PHŒMIUS (*Phamaub*), in *Ancient Geography*, a river of Africa, in the eastern part of Mauritania Cæsariensis.

PHŒNICA, or PHŒNICE, a town of Epirus, in Chaonia, according to Ptolemy, Livy, and Polybius.

PHŒNICA (*Fenck*), a town of Asia, at some distance N.N.W. from Tigraneerta; S. of the lake Thospitis, and besieged and taken by Sapor, king of Persia, as Ammianus Marcellinus reports.

PHŒNICE, PHŒNICIA, a country of Asia, commonly named by the Jews *Canaan*, though some part of it, at least, was known to them by the name of Syrophœnicie. Phœnicie was sometimes extended to all the maritime countries of Syria and Judæa, and Canaan to the Philistines, and even to the Amalekites. On the contrary, these two names, and the rest, were most generally swallowed up by those of Palestine and Syria; or rather Phœnicie, Palestine, and Syria, were promiscuously used for each other, and particularly the two former. Stephanus Byzantinus says, that Phœnicie and Palestine are the same. Syria, in its largest extent, sometimes comprehended Phœnicie and Cœlyryia. The fact is, that the whole coast of the Mediterranean sea from Libanus to Rhincorura, or to mount Casius, in the vicinity of Egypt, before the departure of the Israelites from this last country, was inhabited by people of different origin, *viz.* the Canaanites, afterwards called Phœnicians, descended from Canaan; and the Philistines, sprung from Mizraim. These people lost part of their possessions by the conquest of Joshua, who put the Israelites in possession of the middle part of this coast, from Jannia to mount Carmel. But when the Israelites were carried into captivity by Salmanasar, 721 years B. C., the portion of the country which they had occupied returned to its first masters, who reunited it to their ancient dominion. From this time the Phœnicians and Philistines were no united, that they were considered as the same people, and the whole coast was known by the name of Phœnicia. Strabo (l. xvi.) makes Phœnicia to commence, towards the N., at the town of Orthofia to the S.W. of Aradus; but Ptolemy extends it a little farther to the N., and removes it to the river Eleutherus, which falls into the sea, N.E. of Aradus, and at a small distance from it. The greatest part of the coast of Phœnicia was bounded to the E. by the mountains of Libanus, which are covered with snow during the whole winter. This snow has such a refrigerating effect on the air, that the country towards the N. is cold; but to the N. and S. of these mountains, the air is very temperate.

The proper Phœnicie, as far as we can learn from the ancient geographers, lay between the 34th and 36th degrees of north latitude: bounded by Syria on the N. and the E., by Judæa on the S., and by the Mediterranean on the W. Ptolemy, as we have already said, reckons the river Eleutherus the boundary of Phœnicie to the N., but Pliny, Mela, and Stephanus, place it in the island of Aradus, lying N. of that river. On the coast of Phœnicie, and S. of the river Eleutherus, stood the following towns; Simyra, Orthofia, Tripolis, Botrys, Byblus, Palæbyblus, Berytus, Sidon, Sarepta, Tyrus, Palætyrus. Sidon may be properly called the metropolis of Phœnicie. For an account of the principal towns of Phœnicie, see their respective names. In the midland Phœnicie Ptolemy reckons the following towns, *viz.* Arca, Palæbyblus, Gabala, and Cæsarea

farca Panix. This province was considerably extended in the times of Chriſtianity; when being conſidered as a province of Syria, it included not only Damafcus, but Palmyra alſo.

The foil of this country is good, and produces many articles both of food and clothing; the air is falubrious, and the climate agreeable. The ſea on this coaſt formerly produced a quantity of ſuch fiſh as yielded great profit to Tyre in particular: ſuch was the murex, with which was dyed the choicelt purple; and on the ſhore was a ſand with which the firſt and beſt glaſs was made, as a ſtaple manufacture of this country. Although this country has been long deſolate, it exhibits ſome remains of its ancient ſplendour, more eſpecially at Tyre, Sidon, Byblos, &c. which ſee reſpectively.

The Phœnicians were, without doubt, deſcendants of the Canaanites: though, in proceſs of time, their blood was intermixed with that of foreigners, from the natural courſe of their commerce with other countries. Many ſtrange families muſt have ſettled among them, who could conſequently have no claim to this remote origin, how much ſoever they have been called Phœnicians, and reckoned of the ſame deſcent with the ancient proprietors. Bochart indeed inſinuates (vid. Phaleg. lib. iv. cap. 34.) that the Canaanites were aſhamed of their name, on account of the malediction denounced on their progenitor, and that they were terrified by the wars, which had been with equal vigour and ſucceſs waged againſt them by the Iſraelites, becauſe they were Canaanites; and that, therefore, to avoid the ignominy of the one and the danger of the other, they abjured their old name and changed it for Phœnicians, Syrians, Syrophœnicians, and Allyrians. Heidegger alſo conjectures, that they were aſhamed of their anceſtor Canaan. As to the etymology of their name, learned writers have ſuggeſted a variety of conjectures. The mythological hiſtorians have traced it to a pretended Phœnix, ſon of Agenor, or to a Phœnix, ſaid to be the ſon of Neptune and Libya. Others have derived it from  $\phi\omega\iota\varsigma$ , or the palm-tree, with which Phœnice is ſaid to have abounded. Scaliger pretends that the name of Phœnician was formed from *Pinkkas*, or *Pinnbas*, meaning a perſon who inſpires confidence, which as he ſuppoſes was given to Canaan by the Sidonians. The learned Bochart ſeems to have approached nearer to truth in his conjecture. According to him, theſe people had, in ancient times, been called the children of Anak, or “Beni-Anak:” the *beth* being ſoftened, Beni-Anak was changed into “Phenak,” in the plural “Phenakim,” from which the Greeks formed “Phœnices.” We learn from ſcripture, that the ſpies ſent by Moſes found in Hebron and its environs a people called “Anakim,” or “Enakim:” and that theſe Canaanites were diſtinguiſhed by their ſtature and ſtrength: of courſe, the other Canaanites who claimed the honour of deſcent from them were alſo denominated “Anakims.”

M. l'Abbé Mignot, in his elaborate diſcuſſion of this ſubject, (Mem. Acad. Belles Lettres, tom. xxxiv. &c.) thinks that it is not neceſſary to recur to the word “Beni;” becauſe the Egyptians always prefix the article *phe* to words, ſo that inſtead of “Enakim,” they would read “Penakim,” or “Phonacim:” and the Greeks becoming acquainted in their firſt maritime expeditions on the coaſt of the country with this word, formed from it  $\phi\omega\iota\varsigma$ , and the Latins “Phœnices.”

It has been preſumed by this ingenious writer, who has taken great pains in tracing the origin of the Phœnicians, that a new colony of Canaanites arrived in this country, which drove the ancient inhabitants towards the N., and in

proof of this opinion he refers to Gen. xii. and xiii. Theſe new Canaanites he ſuppoſes to have been the Orientals whom authors have diſtinguiſhed by the appellation of “Egyptian Shepherds,” and who, after having been driven from the country which they had once poſſeſſed, returned again to Paleſtine. Accordingly he ſuppoſes theſe “Shepherds,” of whom we ſhall have occaſion to ſpeak in another article, were the progenitors of the Phœnicians. The kings of the Thebaid, and other princes of Egypt, formed a league againſt them, and carried on a war, which was long and cruel; till at laſt the king Muſphar Muthoſis obliged them to withdraw into a canton, which contained 10,000 aroura or Egyptian acres. The Shepherds fortified this place and encompaſſed it with walls for the ſecurity of their poſſeſſions. Thummofis or Thetmoſis, at the head of 480,000 men, beſieged this place; but deſpairing of ſucceſs, he treated with the beſieged, and granted them permiſſion to retire, with their whole property, to any place they might chooſe, without being purſued or diſquieted in their march. The Shepherds accordingly quitted Egypt, and purſuing their route through the deſert, arrived in Syria, and ſettled in the country which was afterwards called Judea. This departure of the Shepherds from Egypt is ſaid to have taken place before the arrival of Joſeph in that country, *i. e.* in the year 1728 B.C. This fragment of ancient hiſtory throws great light, according to the abbé Mignot, on the Egyptian allegories. The ſynchroniſm of the arrival of the Phœnicians in Egypt with the reign of Menes, leads us to imagine, that the whole fable of the war of Typhon againſt Ofiris is an allegory, under which is veiled the hiſtory of the war of the Phœnicians or Canaanites againſt the Egyptians. Typhon was the brother of Ofiris; and he correſponds to the Canaanites, who were deſcended from Canaan, the brother of Mizraim, and who might be called the brethren of the Egyptians, according to Eaſtern uſage: but although brethren they were not born in Egypt, which the fable ſufficiently indicates, by the different colour which it gives to Typhon, who was red. The Egyptians, compared with the Canaanites, were almoſt black. According to the fable, the war between Typhon and Ofiris was long, and terminated by the retreat of Typhon from Egypt, thus characteriſing the expulſion of the Shepherds. Typhon retired to Abaris, which was called the city of Typhon; but he was obliged to leave it and to abandon the whole country: and as he never returned, he is thought to have been drowned in the overflow of the waters of the Sirbonite lake: but his death is ſuppoſed to have been allegorical; for, according to Plutarch, (De If. and Ofir.) he had two ſons, Judæus and Jeralymus; the meaning of which is, that he entered into Syria, and ſettled in the country of Canaan, ſince occupied by the Jews, and in which was the city of Jeruſalem. According to the abbé Mignot, the commencement of the reign of Salatis, the firſt Shepherd king, may be fixed to the year 2078 B.C., and their departure to the year 1793, before the ſame era. The Phœnician Shepherds re-entered the country of Canaan, from which, about three centuries before, they had departed for Egypt, and ſettled towards the ſouth; and, according to Juſtin (lib. xviii. c. 3.) they eſtabliſhed themſelves in the vicinity of the lake of Aſſyria, *i. e.* the lake Asphaltites; but multiplying there they were under the neceſſity of extending their borders, and taking poſſeſſion of the territory of the ſea-coaſt, which the firſt inhabitants of the country had left vacant; and ſome of them ſettled in the neighbourhood of the Jordan. Their arrival in Paleſtine was the cauſe which induced ſome of the ancient inhabitants

inhabitants to remove towards the north. There they multiplied themselves to such a degree, that the country, which in the time of Jacob was destitute of inhabitants to cultivate the soil, was peopled with a race which terrified the spies of Moses by the magnitude of their cities, and by the number and power of those who inhabited them. The Philistines also are said to have come from Egypt; they were established to the south of the Canaanites, having, in former times, inhabited Pelusium and its territory. The Caphtorim were also of the same race; and these people, together with the Canaanites, constituted the nation, which, in process of time, bore the name of Phœnicians. (See PHILISTINES.) Another French author, viz. M. de la Nauze, maintains (Mem. de Let. t. xxxiv. M. p. 175.) that the Phœnicians, who were also called Erythraeans, were descended from Edom or Esau, and that the Jews considered them as brethren. He says also, that Esau was the same with king Erythras, both names signifying red; and that he was one of the first kings of this nation. But the reply of the abbé Mignot comprehends the following propositions, viz. 1. That the principal towns of the country to which the Greeks gave the name of Phœnicia, had for their founders and first inhabitants, the children and descendants of Canaan. 2. That the inhabitants of Tyre and Sidon, whilst they were called Phœnicians by the Greeks, were named Canaanites in the original text of scripture. 3. That the translators of the bible, which, in the time of Ptolemy Philadelphus, had rendered the Pentateuch into Greek, were persuaded that the Phœnicians were Canaanites, as they often express the Hebrew word "Kenani" by those of Φοινικισ and Φοινισσας, or Phœnicians. 4. That the Phœnicians gave themselves the name of Canaanites. 5. That some profane authors, such as Sanchoniathon and Philo of Biblos, his translator, assure us, that Chna, or Canaan, was the father of the Phœnicians: and others have called Phœnicia the land of Canaan.

The Phœnicians were governed by kings, and their territory, small and narrow as it was, included several kingdoms, viz. those of Sidon, Tyre, Aradus, Berytus, and Byblos or Byblus. In this respect they imitated and adhered to the primitive government of their forefathers, who, like the other Canaanites, were subject to many petty princes, to whom they allowed the sovereign dignity, reserving to themselves the natural rights and liberties of mankind.

As to their religion, the Phœnicians, being originally Canaanites, were at first worshippers of the true God. In the time of Abraham the worship of the Canaanites was not different from his own. But afterwards they combined with the worship of the supreme Sovereign, whom they acknowledged to be the first cause of all things, that of gods, called by the ancients natural and immortal, that is, the sun, moon, stars, and elements. Thus commenced the idolatry of the Phœnicians. They proceeded to reverence as gods those who had rendered any important service to mankind; they decreed to them divine honours; they appropriated temples to their worship; they adorned columns, on which their names were inscribed, and established solemn feasts in honour of them: and moreover, they gave to these new deities the names of the elements, and of those objects to which they had been accustomed to attribute divinity. The first mortal to whom the Phœnicians paid reverence was *Chryfor*, who had invented the method of founding metals, and applying them to the construction of instruments for facilitating agriculture and fishing; who had first ventured himself on the sea, and who had furnished them with the principles

of divination. The worship of this pretended divinity was established wherever they had colonies; and a similarity has been observed between the Chryfor of the Phœnicians and the *Pha* or Vulcan of the Egyptians. With this deity they associated another called *Agroneros* or *Agrotes*, in honour of whom they erected a statue and a temple, and whom they held in very high estimation, as having invented, or at least perfected, the art of tillage.

The other gods of the Phœnicians, named by Sanchoniathon, were *Elioun*, called the *υλοσως*, or most high, and his wife *Berouth*, and his descendants, who were regarded as the founders of the Phœnician nation. Elioun and Berouth had four sons, Ius, called also *Chronos*, *Bethylus*, *Dagon*, and *Atlas*. The wife of Chronos was *Ajlarte*, supposed to be the same divinity with Derceto or Atergates, worshipped at Afcalon. Cronos had seven daughters, called Artemides and Titanides, and two male children, Pothus or Cupidas, and Eros or Love. Cronos had another wife, called *Rbea*, and a third called *Dioné*. To these chief deities they joined marine divinities, such as Nereus, the father of Pontus, from whom sprung Poseidon or Neptune. The *Cabiri*, called also Dioseuri, Corybantes, and Samothraces, received divine honours. Sanchoniathon mentions another prince contemporary with Cronos, called *Adad* or *Ædad*. To these gods we may join *Adonis*, a Phœnician prince, who had reigned over Libanus, and the *dii pataici*, or tutelary gods of vessels. The Phœnicians had also *Beelsamen*, signifying lord of honour, and denoting the sun; *Baal-Berith*, or the Cronos worshipped at Berytus, and several others of the name of *Baal*; *Apollo*, *Melicartus*, *Melcartus* or *Hercules*. There is reason to believe, that the Phœnician idolatry and superstition were not altogether their own; and that their subjection to the Assyrians, Babylonians, Persians, and Greeks, made great alterations in the whole system of their religion. How far they retained, or lost, a due sense and notion of the true God in this their multifarious idolatry, it is not easy to determine. It is reported of the Egyptians, that, amidst their endless polytheism, they still acknowledged one supreme God; and since the religion of the old Phœnicians was in substance scarcely different from that of the Egyptians, it is very probable that their theory and doctrine agreed together as well as their practice and traditions. *Baal* had his prophets and priests in great number. We read of 450 of them, fed at Jezebel's table only. It was their custom to offer burnt-offerings and sacrifices to this god, and to dance about the altar with violent gesticulations; thus working themselves up into a kind of phrensy, and then cutting their bodies with knives and lances, and pretending to prophesy, or rather seeming, as if possessed by some invisible power. This extravagance, in their early days, was accompanied with the barbarous custom of sacrificing persons that were most dear to them to appease their false gods, when they laboured under any public calamities. This inhuman practice is not only charged upon them by the testimony of others, but acknowledged by themselves; and they had it in common with the Egyptians. But it was discontinued here, as well as in Egypt, at an early period. (See ADONIS, ASTARTE, BAAL, and HERCULES.) Among other acts of worship performed by the Phœnicians, one of the most universal was that of saluting the statues of their gods, or kissing the hand in saluting them. The prayers which they addressed to their gods were preceded by lustrations, by washing themselves, and changing their garments. They also had songs, which they chanted to the sound of instruments. The Phœnicians also practised various kinds of divinations and enchantments. Herodotus supposes these people to have practised circumcision: but Josephus asserts, that

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that none of the nations included under the vague name of Palestine and Syria, used that rite, except the Jews; that if the Phœnicians anciently had that custom, they afterward neglected it, and at length wholly laid it aside. They abstained from the flesh of swine.

*Language and Writing.*—Whatever was the origin of the Phœnician language, it is certain that it had no affinity to the other oriental tongues that were used in Arabia, Syria, &c. Their language was a dialect of the Hebrew, the same with that of the ancient Canaanites, and their letters, or characters, were the same or very like to those of the Samaritans. Their alphabet consisted of the same number of letters with the Hebrew alphabet; the forms of their letters were larger; but they were more conformable to those of the more ancient Greek inscriptions. The Phœnician character varied in its figure according to the different cantons in which it was used. The character of Palmyra more nearly resembled the Hebrew; that of Carthage or the Pœni, and that of Sicily or Spain, had a common origin, and bore affinity to that of the Phœnicians. The character, which was common to the Phœnicians, Hebrews, Arabs, &c. was the origin of that of all the nations which lay to the W. of Asia; it passed into Africa by means of the Carthaginians; it was in use in Sicily and Spain before the Romans conquered those countries; Cadmus brought it among the Greeks; it was adopted by the Etruscans; and at length received among all the nations of Europe. Towards the E., it had been for a long time in use in Persia, and it was not improbably the origin, directly or indirectly, of all writing. The Phœnicians, like the Hebrews, Arabs, &c. wrote from right to left; nor had they any vowels in their alphabet, which proves the antiquity of their language, and as some have alleged, that it was the inevitable consequence of hieroglyphical writing.

*Learning and Science.*—The Sidonians, under which appellation we may comprehend the Phœnicians in general, were of a peculiarly happy genius: arithmetic and astronomy are supposed to have taken their rise among them, or were brought by them to great perfection; from them these excellent sciences spread into Greece, together with their letters. They were addicted from the beginning to philosophical exercises of the mind; inasmuch, that a Sidonian, named Mosechus, taught the doctrine of atoms before the Trojan war; and Abomenus of Tyre is said to have puzzled Solomon by the subtlety of his questions. Phœnicie continued to be one of the seats of learning, and both Tyre and Sidon produced their philosophers in later ages; such were Boethius and Diodatus of Sidon, Antipater of Tyre, and Apollonius of the same place, who gave an account of the writings and disciples of Zeno.

*Manufactures and Arts.*—The glass of Sidon, the purple of Tyre, and the exceeding fine linen they wove, were the product of their own country, and of their own invention; and for their extraordinary skill in working metals, in hewing timber and stone, and in a word, for their perfect knowledge of what was solid, great, and ornamental in architecture, the reader need only be reminded of the large share they had in erecting and decorating the temple at Jerusalem under their king Hiram. Their fame for taste, design, and ingenious invention was such, that whatever was elegant, great, or pleasing, in apparel, vessels, or toys, was distinguished, by way of excellence, with the epithet of “Sidonian.”

*Commerce and Navigation.*—As merchants they may be said to have engrossed all the commerce of the western world; and as navigators, they were the boldest, the most experienced, and greatest discoverers, of ancient times: indeed they had, for many ages, no rivals. In planting colonies

they exerted themselves so much, that, considering their habitation was little more than the slip of ground that lay between mount Libanus and the sea, it is surprising how they could furnish such supplies of people, and not wholly depopulate their native country. Their vicinity to Syria, which had a very considerable and regular trade with the more eastern regions, induced them to traffic in foreign commodities; for here they found productions of the natural growth of that soil, and many choice and useful commodities brought from the East, which their own small country could not supply: and having probably been shewn the way by the Syrians, who might have navigated the Mediterranean, they turned their whole attention to trade and navigation, and by an uncommon degree of application, soon eclipsed their masters in that art. The Phœnicians affected no empire but that of the sea, and seemed to aim at nothing but an unmolested enjoyment of their trade. This they extended to all the known parts to which they could reach; to the British isles, commonly understood by the Cassiterides; to Spain, and other places in the ocean, both within and without the straits of Gibraltar; and, in general, to all the parts of the Mediterranean, the Black sea, and the lake Mæotis. In all these parts they had settlements and correspondents; and thus they exercised the great branches included under the term trade, *viz.* importation, exportation, and transportation, in full latitude. Besides this maritime commerce, they had an inland trade in Syria, Mesopotamia, Assyria, Babylonia, Persia, Arabia, and even India, which was of no less extent, and which may serve to give us an idea of the wealth of these people, and how deservedly their merchants are mentioned in scripture as equal to princes. (11. xxiii. 8.) Their country, though small, was the great storehouse that contained every thing which could administer to the necessities or luxuries of mankind, which they distributed to others as they judged would be best for their own interest. Their own commodities were, as we have observed already, the purple of Tyre, the glass of Sidon, and the exceeding fine linen made in their own country; these and other curious pieces of art, in metals and wood, seem to have been the chief, and almost only commodities of Phœnicie itself. Their territory was so small, as not to afford any export of their own growth; and, indeed, it is more likely that they wanted, than abounded with, the fruits of the earth. Their commerce and navigation derived peculiar advantage from their shipping, and they had excellent means for providing themselves with ships. Their larger embarkations were of two sorts, round ships, or gauli, and long ships, gallies, or triremes. When they drew up in line of battle, the gauli were disposed at a small distance from each other in the wings, or in the van and rear; and their triremes were contracted together in the centre. In order to discourage other nations from engaging in commerce, they practised piracy, or pretended to be at war with such as they met when they thought themselves strongest. This was a natural stroke of policy in people who grasped at the whole commerce of the then known world. At Tyre was the famous fishery already mentioned, which contributed so much to enrich that city. In connection with the navigation of the Phœnicians, we might mention their voyages in the service of Solomon; and the long voyage which some of them are said to have undertaken in the service of Necho, king of Egypt, round Africa, sailing out of the Red sea, and returning by the way of the strait's mouth, in which they employed three years.

*Historical Revolutions.*—Phœnicia, as we have already observed, was divided into several small kingdoms, of which some were confined within the narrow bounds of one city, and

and its territory. Of all the kings of Phœnicia, those of Sidon, Tyre, and Arad, seem to have been the most powerful and wealthy, and they certainly make the most conspicuous figure in history; but their successors, and the years of their respective reigns, are involved in obscurity and uncertainty, and interrupted by so many chasms, that it is not possible to give a regular detail of their transactions. For such an account as authentic history furnishes, we refer to the respective articles, *Sidon*, *Tyre*, and *Arad*.

After a variety of vicissitudes, Phœnicia fell under the power of the kings of Babylon. Nabopolassar, whose reign commenced in the year 626 B.C., became master both of Palestine and of Egypt. Tyre, after a resistance of 30 years, was taken in the year 573 B.C. But with the death of Baal, the title of king became extinct; and Phœnicia was for a considerable time governed by judges. Geroftratus was the last of these magistrates; and when he died in the year 554 B.C., the Tyrians sent to Babylon for another governor. Merbal was appointed, with the title of king, and reigned four years. He was succeeded by his brother Iram, or Hiram, in 550 B.C.; and in the 14th year of his reign, Cyrus, according to the Phœnician annals, made himself master of the Persian empire. At this time Phœnicia comprehended the whole coast from the vicinity of Aradus northwards to the frontiers of Egypt. It now became one of the provinces of Persia, and without making any conspicuous figure in history, it sustained itself by its commerce. When Phœnicia at a subsequent period was joined to Syria, it was governed by presidents or rulers sent from Rome. Phœnicia was afterwards one of the provinces which Antony abandoned to Cleopatra; but after the death of both these, Augustus, who passed into Palestine with Herod, granted to him several towns of Phœnicia. This province was one of the scenes in which the apostles and followers of Jesus Christ preached the doctrines of Christianity; but the hatred of the Jews against the Christians excited great troubles: the whole country was in arms, and the Jews revolted against the Romans, till at length Jerusalem was taken by Titus. The succeeding emperors distinguished some of the towns of Phœnicia by their attention. Tyre, among others, received from Adrian, and also from Severus, the title of Metropolis; so that Phœnicia, having its metropolis, was detached from the government of Syria. Under the reign of Theodore, and under that of Arcadius, this province was divided into two distinct parts: one was called "Maritime Phœnicia," or simply "Phœnicia;" and the other, "Phœnicia of Libanus." Maritime Phœnicia had for its metropolis Tyre, on which depended Sidon, Ptolemais, Berytas, Biblos, Tripolis, Arca, Orthofia, Botrys, Aradus, Antaradus, Porphyriion, Paneas, and Sylaminum. Phœnicia of Libanus had for its metropolis Damas, to which were subordinate Laodicea, Abila, Helipolis, Jabrunda, Palmyra, Emisa, Danaba, Evaria, Comoara, Cotada, and Sarracene. Christianity flourished for some time in this province, till at length the Arabs gained possession of it; and Phœnicia, having embraced a new worship, was governed by different dynasties of Arabian princes.

PHŒNICE, one of the names which, according to Pliny, was given to the isle of Tenedos.

PHŒNICIAN CHARACTER. See CHARACTER.

PHŒNICON, in *Ancient Geography*, a town of Egypt, on the route from Coptos to Berenice, between Coptos and Didyme, according to Antonine's Itinerary.

PHŒNICOPTERUS, *Flamingo*, in *Ornithology*, a genus of birds of the order Grallæ, of which the generic character is, bill naked, toothed, bent as if broken; nostrils

linear; feet four-toed, palmate, the membranes semicircular on the fore part; the hind toe is not connected with the others. There are two species mentioned by Gmelin. The birds of this genus combine the characters of the Anseres and Grallæ. They have long legs and neck; the bill is large; the upper mandible carinate above, and toothed on the edge; lower compressed, transversely furrowed; the nostrils are covered with a thin membrane.

#### Species.

RUBRA, or Common Red Flamingo. This is specifically described as having its quill-feathers black. It inhabits Africa and South America. From the top of the bill to the end of the tail it is four feet four inches long, and to the end of the legs six feet; it feeds on aquatic insects and fish; perpetually twists its neck about when eating, so that the upper mandible touches the ground; it makes its nest on hillocks in shallow water, on which it sits with the legs hanging down, like a man sitting upon a stool; it lays two white eggs; is very impatient of cold; the flesh is good, especially the tongue; it changes its colour with its age, being the first year of a white ash, the second rosy, the third full scarlet; tongue covered with about twelve papillæ, which are hooked backwards, and cartilaginous at the tip. The young ones run about with great swiftness, but are unable to fly till they have attained nearly their complete growth. They subsist chiefly on small fishes, ova, and water insects; and frequent during the day the borders of rivers and lakes, withdrawing at night to the high grounds, and lodging amidst long grass. Flamingoes are extremely shy, and are said almost always, unless in the breeding season, to keep together in flocks, having a centinel ever vigilant at his post, by whom the slightest approaching danger is announced, by intimations which produce immediate flight. Their flesh is thought by some not to be inferior to that of the partridge.

CHILENSIS; Chili Flamingo. Quill-feathers white. It inhabits Chili; it is five feet long from the bill to the claws; the bill is covered with a reddish skin; head subcrested.

PHŒNICOPUS GALLINULA, a name by which some authors have called a bird, more usually known by the name tringa.

PHŒNICUM, in *Ancient Geography*, a town of Arabia Felix, upon the coast of the Elanitic gulf, between Hippos and Ahaunathi. Ptolemy.

PHŒNICURUS, in *Ornithology*, a species of *Motacilla*; which see. See also *MOTACILLA Eribacus* and *Succia*.

PHŒNICUS MONS, in *Ancient Geography*, a mountain of Asia Minor, in Lycia. According to Strabo, it was also called Olympus.

PHŒNICUS Portus, a port of the Peloponnesus, in Messenia, near the promontory Aeritas, south-west of Colonis.—Also, a port of the sea, on the east coast of Sicily, near the promontory Pachynus. Ptolemy.—Also, a port of the nome of Libya. Ptol.—Also, a port on the southern coast of the isle of Crete. Ptol.—Also, a port of Asia Minor, on the coast of Lycia, two miles from the town of Patara. Livy.—Also, a port of Asia Minor, on the coast of Ionia, at the foot of the promontory Mimas.

PHŒNICUSA, or PHŒNICODES, one of the seven Æolian isles of the ancients, called *Felicuda*, situated towards the west, to the east of the isle of Ericusa. It took its name, according to Strabo, from its production, which was the phœnix or palm-tree. See FELICUDA.

PHŒNICUSSÆ, a town of Asia, in Syria, which belonged to the Phœnicians.—Also, the name of two islands, placed

placed by Steph. Byz. on the coast of Africa, in the gulf of Carthage.

**PHŒNIGMUS**, *ῥομφαίος*, in *Medicine*, from *ῥομφαί*, red, signifies properly that *redness of the skin*, which is occasioned by certain stimulating substances, mustard, cantharides, &c. which have been therefore called *rubefacients*. The appellation of *phœnigmus* has also been sometimes given to the rubefacient substance itself.

Sauvages has applied the term to a disease, which consists of red or purple spots or blotches upon the skin, without any elevation, inflammation, or fever. His phœnigmus is, in fact, the *petechiæ sine febre* of some writers, and the *Purpura simplex* of Dr. Willan. See **PURPURA**. See Sauvages, *Nofol. Method.*, class x. gen. 32.

**PHŒNIX**, *Φοινίξ*, in *Astronomy*, a constellation of the southern hemisphere; unknown to the ancients, and invisible in our northern parts.

The number of stars in this constellation is thirteen. See **CONSTELLATION**.

This constellation took its name and form from that of a bird famous among the ancients; but generally looked upon by the moderns as fabulous.

The naturalists speak of this bird as single, or the only one of its kind. They describe it as of the size of an eagle; its head finely crested, with a beautiful plumage; its neck covered with feathers of a gold colour, and the rest of its body purple; only the tail white, intermixed with carnation; and its eyes sparkling like stars. They hold, that it lives five or six hundred years in the wilderness; that, when thus advanced in age, it builds itself a funeral pile of sweet wood, and aromatic gums; then it fires it with the wafting of its wings, and thus burns itself; and from its ashes arises a worm, which, in time, grows up to be another phœnix.

Hence the Phœnicians gave the name phœnix to the palm-tree; because, when burnt down to the very root, it naturally rises again fairer than ever.

Ancient historians reckon four appearances of the phœnix: the first, in the reign of Sesostris; the second, in that of Amasis; the third, in that of the third Ptolemy; and the fourth, according to Dion Cassius, as a presage of the death of Tiberius, but Tacitus refers it to Egypt under the empire of Tiberius, and Pliny to the consulate of Quintus Plancius, which took place A.D. 36.

The ancients, however, speak of the phœnix as a fabulous bird.

The ancient Christians refer to the phœnix in some of their accounts of the resurrection.

**PHŒNIX**, in *Botany*, *φοινίξ* of the ancient Greeks, the Date Palm-tree; from which, as a primitive word, Phœnicia, the land of Palm-trees, seems to have derived its name; as likewise perhaps the red colour *phœnicæus* or *puriceus*, from the hue of the sheath when arrived at maturity; which etymology seems to us the more probable, as *puriceus* is sometimes made synonymous with *croceus*, saffron-coloured. *Linn. Gen.* 573. *Schreb.* 776. *Willd. Sp. Pl.* v. 4. 730. *Mart. Mill. Dict.* v. 3. *Ait. Hort. Kew.* v. 5. 369. *Juss.* 38. *Lamarek Illustr.* t. 893. *Gærtn.* t. 9.—Class and order, *Diœcia Triandria*. *Nat. Ord. Palmæ*.

*Gen. Ch.* Male, *Cal.* General sheath of one valve, including a branched stalk. Perianth deeply three-cleft, minute, permanent. *Cor.* Petals three, concave, ovate, rather oblong. *Stam.* Filaments three, very short; anthers linear, quadrangular, the length of the corolla.

Female either on a different plant, or on the same common stalk. *Cal.* and *Cor.* as in the male. *Pistil.* Germen superior, roundish; style awl-shaped, short; stigma acute. *Peric.* Drupa ovate, of one cell. *Seed* solitary, bony,

elliptic-ovate, marked with a longitudinal furrow, nearly opposite to the dorsal embryo.

*Ess. Ch.* General sheath of one valve.

Male, Calyx in three deep segments. Petals three.

Female, Calyx in three deep segments. Petals three. Pistil one. Drupa ovate.

1. *Ph. dactylifera*. Common Date Palm-tree. *Linn. Sp. Pl.* 1658. *Ait. n. 1.* *Stokes Mat. Med.* v. 4. 519. (*Palma*: *Kæmpf. Amoen.* 667. t. 1, 2, 3. *Math. Valgr.* v. 1. 198, 200. *Camer. Epit.* 124. *Ger. Em.* 1517.)—Leaves pinnate, without thorns; leaflets linear-lanceolate, folded, straight.—Native of the Levant. Though it has been cultivated in our stoves for above 200 years, no individual has yet been preserved long enough to blossom, and very few have become caulescent. In the south of France this plant forms a handsome tree, but brings no fruit to perfection. It is well known, that as the male and female flowers are generally the produce of distinct individuals, the two sexes require to be cultivated together, in order to obtain good fruit; and in this chiefly consists the culture of the Palm-tree. Hence the Linnæans have derived one of their most striking proofs of the sexes of plants, the fact being recorded by those who were not instructed in that doctrine. (See **FECUNDATION**, and **SEXES OF PLANTS**.) For an account of the fruit, see **DATE**. The tree is of slow growth, but gradually attains a very lofty stature, consisting of a straight simple scaly trunk, crowned with a noble spreading evergreen tuft of long, pinnate, rigid, smooth leaves. (See **PALMÆ**.) Several axillary drooping bunches of innumerable white flowers, each bunch enveloped in a large coriaceous sheath, proceed from the crown of the stem, and produce an ample crop of dates, which are gathered in the East with great care and ceremony, constituting an important article of food, as well as of commerce. Their quality is as various as that of apples, or any other cultivated fruit. An ample and complete history of this valuable tree, and its whole economy, is to be found in *Kæmpfer*.

2. *Ph. reclinata*. Reclining Date Palm-tree. *Jacq. Fragm.* 27. t. 24. *Ait. n. 2.*—Leaves pinnate, without thorns; leaflets linear-lanceolate, folded, loosely spreading.—Native of the Cape of Good Hope, whence it was sent to Kew by Mr. Masson, in 1792. It is kept in the greenhouse, but has not flowered.

3. *Ph. farinifera*. Small Date Palm-tree. *Roxb. Coromand.* v. 1. 53. t. 74. *Ait. n. 3.*—Leaves pinnate, without thorns; leaflets linear-awlshaped, folded. Flowers with six stamens and three styles.—Native of Coromandel, chiefly found in dry barren sandy places, not far from the sea, flowering in January and February, and ripening fruit in May. The trunk is not above one or two feet high, and entirely enveloped in leaves, which resemble those of the first species in general appearance, but are more pointed, and of a much deeper green. The common flower-stalk, or spadix, bears numerous simple branches, each from eight to twelve inches long, beset with a great number of sessile flowers; the male white; the female green, on a separate tree. The stamens are six, with a three-cleft rudiment of a pistil. The pistil of the female flowers is three-cleft, and there are rudiments of three seeds, as Dr. Stokes well remarks; all which does not accord with the generic character, taken from the first species. Yet Dr. Roxburgh says the pistil is "as in *Phœnix dactylifera*." Probably the character of the latter requires emendation, for which we can only look to some tropical botanist. The fruit of the present species is a purple single-seeded drupa, the size of a large French bean, containing a small quantity of sweet mealy

mealy pulp, and is eaten by the natives of the coast of Coromandel, without any preparation. The stem of the plant contains a large quantity of farinaceous substance, among the woody fibres, affording an inferior sort of sago, to which recourse is had in times of scarcity; but Dr. Roxburgh describes it as bitterish, and inferior in nutritious qualities to real sago. This species is cultivated at Kew, having been procured from India in 1800, by Sir Joseph Banks.

*Ph. pufilla*, Lour. Cochinch. 614. Gært. v. 1. 24. t. 9, answers very nearly to the description of the last, except that the *style* is said to be short, and *stigma* simple. Perhaps the young *styles* cohere, and appear to be only one. Gærtner's figure indicates the rudiments of three *seeds* in the *germen*, as in Roxburgh's plant.

PHENIX, in *Gardening*, contains a plant of the evergreen exotic tree kind, of which the species cultivated is the date palm-tree (*P. dactylifera*).

*Method of Culture.*—This plant may be increased by seed, procured from abroad, or taken out of the fruit, which should be sown as soon as possible in pots of light rich earth, plunging them in a tan hot-bed in the stove, giving moderate waterings; when they soon come up. And when a few inches high, they should be pricked out into separate small pots, plunging them into the hot-bed or bark-bed, where they must remain, giving frequent waterings, and shifting them into larger pots, according as their progress of growth may require. When they are removed, great care should be taken not to injure their large roots, or to over-pot them.

This, like the rest of the palm tribe, has no other branches than its large leaves, each of which is composed of a leaf and branch, always arising from the top; and as the old leaves fall, the stem forms itself, and advances in height. But although the leaves grow very tall in a few years, the stem advances but slowly, and can never be expected to arrive at a flowering and fruiting state in this climate: it, however, merits a place in the hot-house collections for its singularity.

The berries of this tree are the dates of the shops, which are imported from Africa, and the countries in the Levant.

PHENIX, *Φοινίξ*, among the *Ancients*, a musical instrument, not unlike the *cithara*; which see. See also PHÆNIX.

PHENIX, in *Geography*, a port of Asia Minor, on the coast of Lycia.—Also, a mountain of Asia, in the Doride.—Also, a town of Italy, according to Appian.—Also, a river of Greece, in Thessaly, which ran into the Apidanus.—Also, a river of the Peloponnesus, in Achaia, which had its mouth south-west of the gulf of Corinth.

PHŒOPUS, in *Ornithology*, a name used for two different birds; the one called by the Germans *brachvogel*, and the other the *whimbrell*, or *arquata minor*, the small curlew of authors.

The first of these, or the *brachvogel*, is of a deep black colour, spotted with a yellowish and reddish-brown; its beak is long, slender, and black, and is moderately bent; its neck is grey, tending to reddishness towards the bottom; and its belly is white. Mr. Ray suspects this not essentially to differ from the other, but the sight of the bird alone can determine that. See SCOLOPAX *Arquata*.

PHOGOR, in *Ancient Geography*, a mountain of Palestine, on the other side of Jordan.—Also, a town of Palestine, in the tribe of Judah, near Bethlehem.—Also, another town north-east of the Dead sea and of Livias.

PHOKWARAH, in *Geography*, a town of Hindoostan, in Lahore; 50 miles E. of Sultanpour.

PHOLAS, in *Conchology*, a genus of the class and order Vermes Testacea. The generic character is, animal an ascidia; shell bivalve, divaricate, with several lesser differently shaped accessory ones at the hinge; the lunge recurved, united by a cartilage; in the inside, beneath the hinge, is an incurved tooth. There are twelve species. The inhabitants of this genus all perforate clay, spongy stones, and wood, while in the younger state; and as they increase in size, they enlarge their habitation within, and thus become imprisoned. They contain a kind of phosphoric liquor, of great brilliancy in the dark, which illuminates whatever it happens to fall on.

The word pholas is derived from the Greek *φαλας*, and signifies no more than any thing which is hidden; the name was given to this genus of shell-fish from their custom of making themselves holes in earth, sand, stones, or wood, and living hidden in them. Many being of opinion, that these could not work themselves into the substance of hard stones, have thought that they were hatched in holes accidentally formed in stones, and that the shells naturally grew of such a shape as was necessary to fill the cavity. Nor is this the only error propagated concerning the pholas; for as all that was signified by the name being only that the shell was hidden in some solid substance, whenever an author found a shell-fish of whatever kind thus buried in stone, he described it under the name of pholas.

#### Species.

\* DACTYLUS. Shell oblong, with reticulate subspinous striæ on the upper part. It is found among rocks in this country, and other parts of Europe, and shines by night. It is about five inches long; entirely white, with sometimes an ochraceous cast, thin, fragile, elongated, and wedge-shaped on the fore part, convex behind, the margin inflected; it is marked with subspinous striæ, which become gradually more indistinct; the hinge resembles a spoon, and there are four accessory valves.

COSTATA. Shell ovate, and striate with elevated ribs. It inhabits the American seas. It is white, and almost six inches long; the ribs are oblique, and armed with elevated scales or obtuse spines.

STRIATA. Shell ovate, and multifariously striate. This species is found in some of the southern parts of Europe and India, and the coast of Barbary. The striæ are occasionally decussate; the part near the hinge is glabrous, and without striæ.

CANDIDA. Shell oblong, and muricate on all parts with decussate striæ. This inhabits European and American seas, and is very thin; it is silvery within, and more glabrous; rounded at each end; tooth of the hinge is slender and cleft; length near an inch, the breadth an inch and a half.

PUSILLA. Shell oblong, rounded with arched striæ. It is found in different parts of India and America, and penetrates the bottoms of ships. The shell is brownish or white, gaping on the fore part, globular under the top, and marked with reticulate knotty striæ.

\* CRISPATA. Shell oval, the part next the hinge more obtuse, waved, and striate; teeth of the hinge curved, large, and strong. A variety is known by the shell being thinner and smaller; the tooth also is slender and oblique. It inhabits European seas, is about two inches long, and three and a half broad. The primary shells are divided by a transverse wrinkled groove in the middle; the accessory ones are small.

**ORIENTALIS.** Shell oblong, with a straight margin; one-half of it is quite smooth, the other with reticulate striæ. It inhabits Siam and Tranquebar; is large and thin; the shells gape at one end only, and they are marked within with reticulate striæ.

**CAMPECHIENSIS.** The shell of this species is narrow, white, and very finely striate. It inhabits the bay of Campechy. It is probably not a distinct species.

**CORDATA.** Shell short, turgid, and furrowed with fine elevated transverse striæ; aperture heart-shaped. It is found affixed to the Corals. The shell is very thin, fragile, and of a dirty white; the fore part is smooth, except a few arched ridges.

**CHILENSIS.** Shell oblong, a little depressed, with distant longitudinal striæ. It is found about the rocks of Chili. The shell is five inches long, with minute appendages.

**TREBUDA.** Shell oblong, white, with a longitudinal brown granulate suture. It inhabits the Belgic shores, and penetrates timber.

**HIANS.** Shell bivalve, white, with transverse arched striæ; above connivent, convex in the middle, beneath wedge-shaped, with a very large oval aperture. It inhabits the American islands, and perforates calcareous rocks and corals.

As to the luminous quality of this species of shell-fish, observed by Pliny, and by modern naturalists, see **DACTYLUS**.

For an account of a particular species of pholas, called by Dr. Parsons *pholas conoides*, by others *pholas lignorum*, and in Dutch *wood-muscle*, because it is found burrowed in timber, see Phil. Transf. vol. lv. p. 1, &c.

**PHOLIDIA**, in *Botany*, from *φολι*, *φολιδος*, the scale of a fish or serpent; alluding to the scaleiness of the corolla. Brown Prodr. Nov. Holl. v. 1. 517.—Class and order, *Didymia Angiospermia*. Nat. Ord. *Myoporina*, Br.

**Æt. Ch.** Calyx deeply five-cleft, unchanged in the fruit. Corolla funnel-shaped; tube longer than the calyx; throat dilated, tumid at one side; limb short, irregular; its upper lip two-lobed, recurved; lower spreading, in three deep equal segments. Stamens included. Anthers bearded. Stigma capitate, emarginate. Drupa dry, of four cells, with four seeds.

1. *Ph. scoparia*. Found by Mr. Brown, on the fourth coast of New Holland. A rush-like shrub, with opposite awl-shaped leaves. Stalks single-flowered, axillary, solitary, without bractæas. Corolla blue, clothed externally with minute scales. Albumen thin.

**PHOLIS**, in *Natural History*, the name of a genus of fossils of the class of the gypsums or plaster-stones, the distinguishing characters of which are, that the bodies of it are considerably hard, composed of somewhat broad particles, and of a bright crystalline lustre.

The word is derived from *φολι*, a scale, or small flake, from these bodies being composed of particles of that form.

The species of this genus are the most valuable of all the gypsums, as burning to the best and finest plaster; but so far as is yet known, there are but two of them: the fine plaster-stone of Montmartre in France, called by us *plaster of Paris stone*, and *parget*; and the other the coarser and somewhat reddish kind, common in many parts of England, and called *hall plaster*. Hill. See **PARGET**.

**PHOLIS**, in *Ichthyology*, the name of a small anguilliform fish, the back of which is brown, the belly white, and the whole back and sides spotted, and the skin soft and not cov-

ered with scales, but with a tough mucilaginous matte like the eel.

This most of all approaches to the alauda, and though usually somewhat larger, yet Mr. Ray doubts whether it really differs from it in any thing essential; its great distinction being its colour, which, though a very obvious, is a very precarious one.

This is the **BLENNIUS Pholis** of Gmelin, and the blennius of Artedi, with the top of the head acuminated, and the upper jaw the larger, the alauda non cristata of Rondeletius and Gesner, the mulgraave and bulcaud of Willughby and Ray, and the smooth blenny of Pennant. It is found on the shores of the European ocean and Mediterranean sea, and at the mouths of rivers among rocks and algæ, &c. See **BLENNIUS**.

**PHOLLIDES**, a word used by the ancient physicians for soft and fungous tumours of the legs, such as those of people in an anæmia, or leucophlegmacy.

**PHOLLIS**, as a coin. See **FOLIS**.

**PHOLOC**, in *Ancient Geography*, a mountain of Triphylia, south of Onus.—Also, a mountain of Greece, in Thessaly, where Hercules is said to have slain the Centaur.—Also, a small town of the Peloponnesus, in Arcadia, west of the river Erymanthe, according to Pliny and Mela. A mountain of the same name was situated near it to the west, which was the boundary of the Elide.

**PHOMOTHIS**, a town of Asia, in the Marcotide, according to Ptolemy.

**PHONASCIA**, *φωνασκια*, derived from *φωνη*, voice, the art of forming the human voice.

In ancient Greece, there were combats or contests established for the voice, as well as other parts of the gymnastice.

The combats continued to be held in the time of Galen; and they were these that brought the phonascia into vogue. Hence the masters of this art, and those who taught the art of managing the voice, were called *phonasci*, *φωνασκοι*; and under their tutorage were put all those destined to be orators, singers, comedians, &c.

**PHONIA**, in *Geography*, a town of European Turkey, in the Morea; 22 miles W.S.W. of Corinth.

**PHONICS**, *φωνικη*, derived from *φωνη*, voice, or sound, the doctrine or science of sounds (which see); otherwise called *acoustics*; which see.

Phonics may be considered as an art analogous to optics; and may be divided, like that, into *directed*, *refracted*, and *reflected*. These branches the bishop of Ferns, in allusion to the parts of optics, denominates *phonics*, *diaphonics*, and *cataphonics*.

Phonics is improveable, both with regard to the object, the medium, and the organ.

As to the object, sound, it may be improved, both with regard to the production and the propagation of sounds. The first, in speaking or pronouncing, in whistling or finging, or hallooing or luring, which are all distinct arts, and all improveable. The second, by the position of the sonorous body.

With regard to the medium, phonics may be improved by the thinness and quiescency thereof, and by the sonorous body being placed near a smooth wall, either plane or arched, especially cycloidally or elliptically: whence arises the theory of whispering places.

Add to these, that by placing the sonorous body near water, its sound is mollified; that by placing it on a plain, the sound is conveyed to a greater distance than on uneven ground, &c.

As to the organ, which is the ear, it is helped by placing

It near a wall, especially at one end of an arch, the sound beginning at the other; or near the surface of water, or that of the earth.

And also by instruments, as the sceptorophonicon, or speaking-trumpet.

Also by an instrument to help weak ears as spectacles do eyes; by an instrument to take in vastly remote sounds, as telescopes do objects; by a microphone, or magnifying ear-instrument; and by a polyphone, or multiplying ear-instrument.

Cataphonics, or reflected hearing, may be improved by several kinds of artificial echoes; for, in general, any sound falling, either directly or obliquely, on any dense body of a smooth surface, whether plain, or arched, is beat back again, or reflected, *i. e.* it echoes more or less. See ECHO.

PHONICUM CENTRUM. See CENTRUM.

PHONOCAMPTICUM CENTRUM. See CENTRUM.

PHOORY, in *Geography*, a town of Hindoostan, in Baglana; 28 miles S. of Zolnani.

PHORA, in *Ancient Geography*, a town of Asia, in Greater Armenia, between Tasco and Mapa, according to Ptolemy.

PHORAGA, a town of Asia, in Aria. Ptolemy.

PHORBÆ, a town of Thessaly, which belonged to the Achaëans; called also *Phorbas*.

PHORBANTIA, an island on the coast of Sicily. Ptolemy.

PHORBANTIUM, a mountain of Thessaly, in the Trazena. Steph. Byz.

PHORBEIA, *φορβεία*, a musical instrument of the ancients, implies a *capistrum* or leather bandage, with which the players on the flute surrounded their heads. The phorbeia was placed before the mouth of the musician, opposite to which was a slit for the reed to pass through. See FLUTE.

This bandage was used for the purpose of augmenting the force of the wind, and not only to prevent the swelling the cheeks of the performer, but to prevent the wind from escaping at the sides of the reed. See CAPISTRUM.

PHORCYNUS, in *Ancient Geography*, a port of the isle of Ithaca, mentioned by Homer, and also by Strabo.

PHORIMOS, a name given by some authors to rock alum.

PHORINE, a word used by some authors to express the skin of a hog; some also understand it to mean a skin of any kind, extending it even to the human cutis.

PHORMINX, an ancient musical instrument, seems to have been the largest kind of lyre. See LYRE.

PHORMIUM, in *Botany*, a name adopted by Forster from the ancient Greeks, whose *φορμιον* was used for making mats, or baskets, being so called from *φορμιος*, a basket or pannier. Forster's plant serves for similar purposes in New Zealand. Forst. Gen. t. 24. Linn. Suppl. 28. Schreb. 799. Willd. Sp. Pl. v. 2. 171. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 2. 284. Juss. 52. (Lachenalia; Lamarck Illustr. t. 237. f. 2. Chlamydia; Gært. t. 18.)—Class and order, *Hexandria Monogynia*. Nat. Ord. *Coronaria*, Linn. *Asphodeli*, Juss.

Gen. Ch. *Cal.* none. *Cor.* Petals six, obliquely ascending, oblong, converging into a tube, united at the base, unequal; the three outermost acute, keeled; the three innermost longer, reflexed rounded and vaulted at the extremity, slightly emarginate. *Stam.* Filaments six, thread-shaped, ascending, longer than the corolla; anthers erect, nearly triangular. *Pist.* Germen superior, oblong, obtusely triangular; style thread-shaped, nearly erect, rather

shorter than the stamens; stigma simple. *Peric.* Capsule oblong, pointed, with three furrowed angles, three cells and three valves; the partitions from the middle of each valve. *Seeds* numerous, imbricated in two rows along each partition, ovate, black and shining, compressed, bordered.

*Ess. Ch.* Corolla inferior, of six petals; the three inner ones longest. Stamens prominent. Capsule oblong, triangular. Seeds compressed, bordered.

1. *Ph. tenax*. New Zealand Flax. Forst. Prodr. 25. Linn. Suppl. 204. Cook's Voyage, v. 2. 96. t. 96. J. Mill. Ic. t. 2.—Native of New Zealand and Norfolk Island. Hardy in our climate, flowering in June and July, but rarely. *Root* perennial, long, with many strong fibres. *Stem* none. *Leaves* radical, numerous, erect, linear, acute, keeled, entire, smooth, four or five feet long, tough and rigid, of a glaucous green; stained with orange-colour about the lower part. *Flower-stalk* radical, branched, many-flowered. *Flowers* yellow, each about an inch and a half long. *Capsule* three inches long. Very strong and good thread may be manufactured from the fibres of the leaves.

PHORMORAPHIS, in the *Materia Medica*, a name often used by the later Greek writers, and generally looked on as one of their unintelligible words, or the name of some drug not known at this time. See CARPESIA.

PHORONICUM, in *Ancient Geography*, a name given by Pausanias and Steph. Byz. to a town of Argos, the capital of the Argolide.

PHORONOMIA, derived from *φορα*, motion, and *νομος*, law, is a science comprehending the laws of motion, both of solids and fluids. The work of Hermannus, printed at Amsterdam in quarto, in 1715, under this title, is well known.

PHORONTIS, in *Ancient Geography*, a town of Asia Minor, in Caria. Pliny.

PHORUM, a port of Greece, in Attica, in the vicinity of Pnyttalia. Strabo.

PHOS, a word used by some medical writers to express a distemperature of the eye, in which there is seen a black circle wholly surrounding the pupil.

PHOSCAS, in *Ornithology*, a name of a fresh-water fowl of the duck kind, and of the size of the common wigeon. Its body is remarkably flat; its beak and legs are blue; its head and neck are of a brownish colour, variegated all over with numerous triangular black spots.

PHOSGENE GAS, in *Chemistry*, a species of gas lately discovered by Mr. John Davy, in his efforts to unite together the carbonic oxyd and the oxymuriatic gases. Some unsuccessful attempts had been made for this purpose by Messrs. Gay-Lussac and Thénard, and afterwards by Mr. Murray of Edinburgh. Mr. Davy accomplished this object apparently without any difficulty. The gases were put in contact and exposed to a bright light for a quarter of an hour; when the mixture was diminished to half its original bulk, and a gas was left, which possessed several remarkable properties. It is composed of equal volumes of chlorine and carbonic oxyd gases, condensed into half their bulk. It is colourless; and has a strong disagreeable smell. Its specific gravity is 3.669; and 100 cubic inches, under a mean temperature and pressure, weigh 111.91 grains; hence it is by far the heaviest gas at present known. It reddens vegetable blues. It combines with ammonia, condensing four times its bulk of that gas, and forming a peculiar neutral salt. Phosgene gas is decomposed by water, and by most metallic bodies. It is an acid of a very peculiar nature, and deserves a much more complete examination. As this gas has been hitherto produced only by the actua

of light, Mr. Davy proposed to name it "phofgene." Phil. Trans. for 1812, part i.

PHOSPHATS, are salts formed by the phosphoric acid, with the different saline bodies. See the respective bases, as POTASH, SODA, &c.

PHOSPHITES, salts formed by the phosphorous acid combining with the bases of salts.

PHOSPHOLITE. See APATITE.

PHOSPHORI, or *Phosphorescent Substances*, may be distributed into three classes. The first comprehends those which require a previous exposure to the solar or other light, in order to become luminous; on which account they are called "solar phosphori." See PHOSPHORUS.

The second class includes those which, without any necessary previous exposure to light, become luminous when moderately heated; these, by way of distinction, may be denominated "phosphori from heat." These differ from the former in that, after having been continued at any particular temperature till their luminousness is exhausted, they are incapable of becoming again luminous, except at a greater heat than that to which they were first subjected. The range of temperature at which these bodies become luminous, commences at about 400° Fahr., and terminates at the lowest visible red heat. In some the light is almost momentary; in others it remains many minutes. The intensity of the light appears to be unalterable, whether the body that emits it be in a Torricellian vacuum, or plunged in any of the natural or artificial gases. The following substances are arranged by Mr. T. Wedgwood, according to the brilliancy of their light. See Phil. Trans. vol. lxxii. p. 28.

The most phosphorescent of all substances by heat, is that variety of the blue fluor of Derbyshire, which when scraped or struck emits a fetid bituminous odour; it glows, when moderately heated with a pale emerald green light, sufficiently intense to be very visible even in day light. To the second rank belong the common swine-stone, the common blue fluor, and red felspar, all of which, as well as those that follow, exhibit a white or reddish light. The third class includes the diamond, the ruby, carbonated barytes, chalk, colourless calcareous spar, sea-shells, granite, and white fluor. The fourth class comprehends white sand, carbonated magnesia, heavy spar, flint, white marble, quartz, porcelain, and earthen ware. The fifth class includes most of the metals, sulphat of potash, borax, white paper, white linen, sawdust, and asbestos. Under the sixth and last class are comprehended oil, wax, spermaceti, and butter when nearly boiling. To exhibit with the greatest effect the luminous property of these bodies, the harder ones should be coarsely pulverised and sprinkled in a dark room on the surface of a thick metallic plate, heated below redness. A very striking exhibition of the phosphorescence of the fetid blue fluor may be made by heating some oil in a clear flask till it becomes luminous, and then dropping in about a teaspoonful of pulverised fluor; at the instant when this latter comes in contact with the hot liquid, a bright flash of green light is given out, which may be renewed for many times, by repeatedly shaking the vessel. Most of the substances above mentioned, are phosphorescent also by friction. Sir H. Davy has also observed, that if fluor be heated till it ceased to become luminous, it is still capable of producing light by collision; and it is observed, that certain other bodies, as tremolite, and a particular variety of blende, give out much light even from the scratch of a pin.

The third class of phosphorescent substances, consists of those which, belonging to the animal and vegetable kingdoms, emit light spontaneously at the common temperature,

without the necessity of previous exposure to light: these may be denominated "spontaneous phosphori." Animal substances exhibit this appearance before the commencement of putrefaction; and it ceases when the putrefaction is complete. Among those who have directed their attention to this subject, we may reckon Boyle, Canton, and Dr. Hulme. See LIGHT.

PHOSPHORIA,  $\Phi\omega\sigma\phi\omega\rho\iota\alpha$ , in *Antiquity*, a festival in honour of Phosphorus or Lucifer.

PHOSPHORIC ACID, in *Chemistry*. This acid is found in combination with lime, soda, and ammonia in animal substances, and is also a component part of several minerals. It may be obtained, but not in a state of purity, from the bones of animals. For this purpose, the bones are first burned to whiteness in a red heat, and then reduced to a fine powder. This powder is decomposed by the sulphuric acid, by which means the phosphoric is set free in the liquid form, while the sulphat of lime is insoluble. This liquid, however, is found not to contain the phosphoric acid pure, but combined with some lime. Hence this process is not resorted to for getting pure phosphoric acid. The following is unobjectionable.

Into some hot nitric acid project small bits of phosphorus, till no more effervescence takes place. The nitric acid is decomposed, giving the whole of its oxygen to the phosphorus, while the nitrogen which constitutes the effervescence escapes in the form of gas. A thickish fluid results from this process, which, when evaporated in a platina crucible, still thickens till it is raised to a red heat. On cooling it assumes the solid form, and is transparent like glass. This is the pure phosphoric acid, which in this form is also called phosphoric glass. It possesses all the essential properties of an acid. It has a sharp acid taste, and changes vegetable blues to red.

Its affinity for water is such that it soon deliquesces in the air, exhibiting the same viscid oily appearance which it possessed before evaporation. It has no smell, not being volatile at less than a red heat, when it exhales in the form of white smoke.

In the state of glass its specific gravity is 2.516, which will be less in the liquid form as it contains more water.

It dissolves readily in water, producing heat, though much inferior to that produced by the combination of the sulphuric acid with water; a proof that the former has less attraction for water.

This acid is known to consist of 1 atom of phosphorus to 2 of oxygen. The atom of phosphorus being 9, and that of oxygen 7, will make the acid  $9 + 14 = 23$ , which is near the truth. It does not combine with more oxygen, although its affinity is great for that substance.

It is not decomposed in the cold by any of the inflammable bodies, the alkaline and earthy bases excepted. Charcoal, zinc, and iron decompose it, when assisted by a strong heat in a close retort, setting the phosphorus free. It is in this way that phosphorus is obtained. In its dilute state it acts on several of the metals, as zinc, tin, and iron. They are first oxydated by the water, when hydrogen gas is evolved. The acid then combines with the oxyd, forming salts, which are described under their respective bases. It combines with the alkalies, earths, and the rest of the metallic oxyds.

The experiments of Lavoisier and Dalton agree in making the proportion of oxygen to be what has been already stated. The former chemist found that 114 of the acid contained 69.375 of oxygen.

PHOSPHORIC Matches, or *Tapers*, are prepared by the following

following simple process. Take a glass tube, four inches long, and one line in diameter, closed at one end. Introduce a small quantity of phosphorus into the tube, and push it to its farther end; after which, a taper covered with a small quantity of wax is introduced into the same tube. The open end is then hermetically sealed, and the other end is plunged into boiling water; upon which the phosphorus melts, and fixes itself upon the match. A line is drawn at one end of the length of the tube, with a flint, that it may be broken, as occasion may require. The match is to be drawn out quickly to inflame the phosphorus.

The process of M. Lewis Pegle for making the inflammable bougies consists in taking a glass tube, five inches long, and two lines wide, one end of which is sealed with a blow-pipe. Small tapers of wax are prepared, with three double threads of cotton twisted together. The extremity of the match or taper is half an inch long, and must not be covered with wax. A piece of lead is laid in a saucer filled with water; and upon this the phosphorus is cut, beneath the water, into fragments of the size of a grain of millet. One of these grains is to be dried, and introduced into the tube of glass; after which the fortieth part of a grain of very dry sulphur is to be added, that is, half the weight of the phosphorus. One of the bougies is then taken, and its extremity dipped in very clear oil of wax. If too large a quantity rises, it must be dried with a cloth. The match is introduced into the tube with a turning or twisting motion between the fingers. The bottom of the tube must then be plunged into boiling water, to soften the phosphorus; observing to keep it no longer than three or four seconds in the water. The other extremity of the tube is afterwards sealed. These bougies must be kept in a tin tube, to avoid the danger of inflammation.

**PHOSPHORIC Bottles**, are formed by heating a glass bottle, and fixing it in a ladle full of sand; and then two or three small pieces of phosphorus are introduced into it. A small red-hot iron wire is used to stir the phosphorus about, and cause it to adhere to the internal surface of the bottle, where it forms a reddish coating. The heated wire is introduced repeatedly; and when all the phosphorus is thus distributed within the bottle, it is left open for a quarter of an hour, and afterwards corked. When this is used, a common match tipped with sulphur is introduced into the bottle, turned round, and quickly drawn out. The phosphorus which sticks to the sulphur takes fire, and lights the match.

The theory of this phenomenon depends upon the circumstance, that the phosphorus is strongly dried, or half calcined, and needs only the contact of air to set it on fire.

As phosphorus is soluble in oils, more especially the volatile oils, these oils become luminous. If this solution be kept in a bottle, a phosphoric flash, which emits a small quantity of light, will be seen every time the bottle is opened. The oil of cloves is used in this operation. The combination of phosphorus and oil appears to exist naturally in the glow-worm, or "*lampyris splendidula*" of Linnæus. Forster of Gottingen observes, that the shining matter of the glow-worm is liquid. If the glow-worm be crushed between the fingers, the phosphorescence remains on the finger. Henckel reports, in his eighth dissertation of his "*Pyritologia*," that one of his friends of a sanguine temperament, after having danced much, perspired to such a degree, that he thought his life in danger. While he undressed, lines of phosphoric flame were seen on his shirt, which left yellow red spots behind them, resembling the residæ of burned phosphorus. This light was long visible.

A phosphoric gas may be extracted from phosphorus, which takes fire by the mere contact of air. It is to the disengagement of a gas of this nature, that we may attribute the ignes fatui which play about burying grounds, and generally in all places where animals are buried and putrefy. It is to a similar gas, that we may refer the inflammable air which constantly burns in certain places, and upon the surface of certain cold springs. Chaptal's *Elem. of Chemistry*, vol. iii.

**PHOSPHORICAL COLUMN.** See **COLUMN.**

**PHOSPHOROUS ACID**, in *Chemistry*. When phosphorus is exposed to the air in an open vessel for a length of time, it gradually assumes the form of a thick fluid, of the appearance of oil. This is the phosphorous acid. The slowness with which it combines with oxygen only allows it to combine with 1 atom of oxygen, by which it is constituted. Its atom is, therefore, 9 of phosphorus with 7 of oxygen, equal to 16.

It is of a viscid oily consistence, having an acid taste, and the smell of garlic.

When exposed to heat some of the water evaporates, but the acid does not become concrete like the phosphoric. In this situation the water is decomposed. The oxygen combines with one portion of the phosphorous acid, forming the phosphoric acid. An atom of phosphorus combines with the hydrogen, forming phosphuret of hydrogen, which escapes in the form of gas. So that out of three atoms of phosphorous acid, and one of water, two atoms of phosphoric acid, and an atom of phosphuretted hydrogen, are formed.

If the phosphorous acid be exposed to the air for a considerable length of time after it is formed, it is converted into phosphoric acid.

When this acid with water is poured upon zinc, tin, or iron, the water is decomposed as with the phosphoric acid, but the hydrogen combines with phosphorus, forming phosphuretted hydrogen, which is known by the smell.

The sulphuric acid, when aided by heat, gives an atom of oxygen, which converts it into the phosphoric acid, while the sulphurous acid escapes in the form of gas. The nitric acid produces a similar change.

**PHOSPHORUS**,  $\Phi\omega\sigma\phi\omega\rho\omega\varsigma$ , formed from  $\Phi\omega\varsigma$ , *light*, and  $\rho\omega\sigma\phi\omega\rho\omega\varsigma$ , *I bear*, a matter, which shines, or even burns, spontaneously, and without the application of any sensible fire.

Phosphori are either *natural*, or *artificial*.

**PHOSPHORI**, *Natural*, are matters which become luminous at certain times, without the assistance of any art or preparation.

Such are the glow-worms, frequent in our colder countries; lantern-flies, and other shining insects, in hot countries; rotten wood; the eyes, blood, scales, flesh, sweat, feathers, &c. of several animals; diamonds, when rubbed after a certain manner, or after having been exposed to the sun or light; sugar and sulphur, when pounded in a dark place; sea-water, and some mineral waters, when briskly agitated; a cat's or horse's back, duly rubbed with the hand, &c. in the dark; nay, Dr. Croon tells us, that upon rubbing his own body briskly with a well-warmed shirt, he has frequently made both to shine; and Dr. Sloane adds, that he knew a gentleman of Bristol, and his son, both whose stockings shone much after walking.

All natural phosphori have this in common, that they do not shine always; and that they never give any heat.

The natural phosphori are either *soluble*, *vegetable*, or *animal*.

The

## PHOSPHORUS.

The fossile are, though very different in degree, some sorts of earths, white sand, limestones, stalactites, and several other figured stones, island crystals, flints, some species of agates, white arsenic; but no sort of metals, metallic or sulphureous bodies, as jet, amber, except the before-mentioned arsenic.

On the other hand, salts imbibe light, provided they are divested of every metallic principle; otherwise not, though as pellucid as possible. For this reason none of the vitriols will imbibe light; but other salts will though with a considerable difference as to quantity; for sal gem and rock salt imbibe very little; sea salt, if dry, and in crystals, much more; and, in like manner, sal ammoniac, sal catharticum, and nitre yet more. This power is weak in the natron of the ancients, and alum; but brightest of all in borax.

In the vegetable kingdom we find very few phosphori; that of dry rotten wood is weak and not lasting; it appears chiefly upon the edges and inequalities of the surface. But this is most remarkable in the rotten wood of the fir-tree, and some others, where, in the dark, you see shining spots as big as tares; whereas in full light the whole surface appears alike. Some few bars are luminous, but not considerably so; but no fruits, seeds, or their meals. Cotton, and the crystals of tartar, appear very bright, but fine loaf-sugar appears the most luminous of all both without and within; gums and resins retain no light.

There is a vast variety of phosphori in the animal kingdom, such as the bones and teeth; to these may be added the shells of fish, egg-shells, the human calculus, bezoar, and those parts of animals in which the terrestrial principle is very predominant. But where there is a considerable quantity of oily matter, as in the hoofs, horns, and feathers, no light is manifest, or at least in a small degree. Light is visibly retained by the skins of several living animals. Water cannot be made to imbibe light, though ice does exceedingly well, and especially snow.

Beccarius proposes some queries concerning the natural phosphori, of which the first is, in what and how great a light the object ought to be placed? He tried different phosphori, in different degrees of light, and found them imbibe most light from the sun itself; next in quantity when the sky was clear; and the least in foggy weather. These experiments should be made in the open air, and not in a house with the glass-windows shut; because many bodies appear luminous when the light has come directly to them, which will not have that appearance when the light has passed through the glass. He lastly tried what light they would imbibe from very bright flame, and found that alabaster itself, which is saturated more than any substance by the sun's rays, imbibed exceedingly little. The next query is, how long these bodies should remain in the light to be sufficiently saturated? Four or five seconds were found the utmost length of time required for that purpose. The other query is, how long the received light will continue in these phosphori? It does not last the same time in all; but continues more or less, from two seconds to eight, in proportion to the strength of the phosphorus, and the quantity of light received.

But that which, of all natural phosphori, has occasioned the greatest speculation, is the

PHOSPHORUS, *Barometrical*, or *Mercurial*. M. Picard first observed, that the mercury of his barometer, when shaken in a dark place, emitted light; with this circumstance, that in shaking the mercury with rapidity, sometimes above, and sometimes below its equilibrium with the air,

the light was only seen when below it, where it appeared as if adhering to the upper surface.

But this light is not found in the mercury of all barometers; which occasions a great difficulty.

M. Bernouilli, upon examining the circumstances of this phenomenon, invented a solution of the same; he imagines, that upon the mercury's descending, the vacuum in the tube increasing, there issues out of the mercury to fill up this excess of vacuity, a very fine subtile matter, before dispersed throughout the pores of this mineral; and that, at the same time, there enters through the pores of the tube another fine matter: thus, the first matter emitted from the mercury, and collected over its surface, striking impetuously against that received from without, has the same effect with Descartes' first element against the second; that is, it produces the motion of light.

But why, then, is not the phenomenon common to all barometers? To this he answers, that the motion of the subtile matter out of the mercury may be weakened, and prevented, by any heterogeneous matter collected on its upper surface, into a kind of pellicle, so that the light should never appear, but when the mercury is perfectly pure. This reasoning seemed confirmed from the experiments of several barometers, which he made according to this plan; but the Royal Academy of Sciences, repeating experiments with barometers made after the same manner, did not meet with the same success; the light being found in some, but not in others.

M. Homberg, therefore, conjectured, that the difference consisted in the different qualities of the quicksilver: in some, he observed, they used quick-lime to purify it; in others, steel-filings. The mercury, then, rising in the distillation, and passing through the lime, might take away some parts thereof, capable, by their extreme smallness, of lodging in its interstices.

Hence, as quick-lime always retains some fiery particles, it is possible, in a place void of air, where they swim at liberty they may produce this lustre.

Mr. Hauksbee has several experiments on the mercurial phosphorus. Passing air forcibly through the body of quicksilver, placed in an exhausted receiver, the parts were violently driven against the side of the receiver, and gave all round the appearance of fire; continuing thus till the receiver was half-full again of air.

From other experiments he found, that though the appearance of light was not producible by agitating the mercury in the same manner in the common air, yet that a very fine medium, nearly approaching to a vacuum, was not at all necessary.

And, lastly, from other experiments he found, that mercury inclosed in water, which communicated with the open air, by a violent shaking of the vessel wherein it was inclosed, emitted particles of light in great plenty, like little stars.

By including the vessel of mercury, &c. in a receiver, and exhausting the air, the phenomenon was changed; and, upon shaking the vessel, instead of sparks of light, the whole mass appeared one continued circle of light. Farther, if mercury be inclosed in a glass tube, close stopped, that tube is found, on being rubbed, to give much more light, than when it had no mercury in it. When this tube has been rubbed, after raising successively its extremities, that the mercury might flow from one end to the other, one sees a light creeping in a serpentine manner all along the tube; that is to say, the mercury is all luminous. The mercury, being made to run along the tube afterwards

## PHOSPHORUS.

Afterwards without rubbing it, was found to emit some light, though much less than before: this proves that the friction of the mercury against the glass, in running along, does in some measure electrify the glass, as the rubbing it with the hand does, only in a much less degree. This is more plainly proved by laying some very light down near the tube, for this will be attracted by the electricity raised by the running of the mercury, and will rise to that part of the glass along which the mercury runs; and it is very plain from this, that what has been long known in the world under the name of the phosphorus of the barometer is not a phosphorus, but merely a light raised by electricity, the mercury electrifying the tube. Phil. Trans. N<sup>o</sup> 484. See ELECTRICITY and MERCURY.

PHOSPHORI, *Artificial*, are such as owe their luminous quality to some art or preparation.

Phosphori are, it is well known, often produced by art; some are made by the maceration of plants alone, and without any fire; such as thread, linen cloth, but above all paper. The luminous appearance of this last, which is now known to be an electrical phenomenon, is greatly increased by heat. This is confirmed by two experiments; the first is, by exposing the paper, spread upon an iron grate, to the naked fire, yet not near enough to scorch it, and then laying a warm brick thereon to retain the heat; by which means it was observed, that where the paper was not screened by the iron grate, it was most luminous; so that by the lights and shades you might distinguish in the dark the image of the iron grate a considerable time. The other experiment is, the application of the paper to a plate of warm brass; from which, when in the dark, you might very easily, by its being less luminous, distinguish the margin of the paper that had not been warmed by the brass.

However Beccarius, though he acknowledges that paper, after having been made red-hot and cooled again, is an excellent phosphorus, found, that it was much injured by being exposed to the light of the sun. He made experiments to the same purpose with a great variety of substances, mineral, vegetable, and animal; and observed, that the effects were the same, and that the stronger the light was, and the longer they were exposed to it, the more injury they received: and he found also, that the injury they received was lasting.

The same author takes notice also of those phosphori which become so by the assistance of fire; but the fire here spoken of is not great enough to dissolve their constituent parts, but only such as may affect the external parts of their texture, and that but gently; so that the process here mentioned is only drying or roasting. For it is not the watery or the saline parts in bodies which are torried, but the oleaginous, with which many vegetables, and most animals abound. The white flesh of animals, such as that of chickens, become a phosphorus by roasting, as well as the tendons; and whatever parts of animals become glutinous by boiling, such as carpenters' glue, isinglass, &c. to these may be added cheese. Bones, though they imbibe light without any preparation, have that property in a much greater degree when burnt, and their luminous appearance is much more lively. But roasting has not this effect upon feathers, hoofs, horns, and only in a small degree on whites of eggs, though the yolk when dry easily became a phosphorus.

The same operation which produces several phosphori from the animal kingdom, gives also several from the vegetable. Thus, by gently roasting ginseng, as myrrh, gum tragacanth, and others, they appear luminous, though dif-

ferent in degrees; and this light is clear in proportion to the gentle evaporation of the aqueous parts. By this treatment nuts of every kind, pulse, corn, coffee-berries, meal, bread, and wafers, also become phosphori. Turpentine, amber, and some resins, require more fire before they imbibe light; so that you must divert them of their acid, and their light ethereal oil, to make them appear luminous. But here great care must be taken that they boil no longer than from being white they turn yellow; for, if you proceed longer, your labour is lost. Those phosphori produced by torrefaction soon lose their power, which, perhaps, neither time, nor a thorough dissolution of their parts, can deprive the natural ones of. In general, as long as the phosphori gained by torrefaction preserve their power, their light is more sharp and striking, but the natural more weak. Those that are gained by calcination, and Baldwin's phosphorus, seem to possess both the striking light of those gained by torrefaction, and the weaker light of the natural phosphori: the last they preserve a long time, but the former is lost, by degrees, much sooner. The well calcined ashes of plants, or rather their terrestrial parts, remaining after the solution of their fixed salts by washing, and neutral salts, continue phosphori after many years: so that, as far as we can judge, the luminary power which is gained by calcination, though not so intense, continues perpetual; whereas, that gained by torrefaction always decreases, and, in a very little while, is no longer visible. Some, even by this method, continue to imbibe light much longer than others. Gum arabic, which continues longest, lasts six days; bread not one, and coffee only a few minutes. However, at any time, by a fresh torrefaction, you may recover these languid phosphori; in which property they have great likeness to the Bolognian stone, and other phosphori prepared by art.

Almost all bodies, by a proper treatment, have that power of shining in the dark, which, at first, was supposed to be the property of one, and afterward only of a few. How this is brought about is not easy to solve. If we suppose, with some, that the light from a luminous body enters and abides in the phosphori; we shall find somewhat new to admire in light itself. It is no new opinion, that this fluid consists of very fine particles, which are continually darted forth from a luminous body in all directions, with a very great velocity: but it has by nobody been laid down hitherto, that these particles are not dissolved by the violence of their agitation, nor dispersed, nor immediately cease to exist; but subsist still, and adhere to what bodies come in their way, as heat does. If, therefore, the particles of light are not dissolved as soon as they are emitted from a radiant body, but continue some time, what else is required but that we allow its atmosphere to every lucid appearance? If the phosphori shine with a borrowed light, but not with their own, and that only when put in motion, and fired by the rays of a shining body, which some experiments seem to confirm, then other new doctrines will arise. There must be then a hidden, a secret principle in bodies, to be lighted up by this most subtle fire. There will be in the universe a certain perpetual fire from these phosphori; the matter of which, though constantly dissipated by burning, does not waste enough to be obvious to our senses. See Phil. Trans. N<sup>o</sup> 478. in vol. xlv. art. 17. p. 83. and Beccarii Com. p. 52. 91, &c. See LIGHT, LIGHT from Diamonds, and Bolognian PHOSPHORUS, *infra*.

Of artificial phosphori there are three principal kinds: the first *burning*, which consumes every combustible it touches; the other two have no sensible heat; and are called

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called the *Bononian* and *Hermetic* phosphorus, to which class others of a similar kind may be reduced.

PHOSPHORUS, *Burning*, in *Chemistry*, is a simple inflammable substance.

The discovery of this phosphorus was first made in 1677, by one Brandt, a citizen of Hamburgh, in his researches for the philosopher's stone. Brandt communicated the secret to one Kraaft, of Dresden, but withheld it from Kunckel; upon which this chemist, knowing that urine was the substance employed, succeeded in his attempts of making phosphorus; accordingly, this phosphorus is commonly called *Kunckel's* phosphorus, after his name. A similar phosphorus was also made by Mr. Boyle, after having seen a piece of it in the hands of Kraaft, who brought it to London in 1679, in order to shew it to the king and queen of England; having been only informed that this phosphorus was produced from some matter belonging to the human body. Kraaft, indeed, told Stahl, that he had communicated the process for making it to Mr. Boyle; but this is such an imputation on the integrity and honour of our English philosopher, as can by no means be admitted on the testimony of a man, who had been treacherous to Kunckel, who traded in the secret of making phosphorus, and after selling it to many persons, published the process for making it in the *Mercurie Galant*, for June 1683. Kunckel, and a German chemist called Godfreid Hantkowitz, to whom Boyle communicated the method of preparing it, were the only persons who made it in any considerable quantities.

M. Hellot, in his *Memoir* upon this subject, *Ac. Paris*, 1737, enumerates all the processes for making it, that were in use soon after the discovery of it; viz. that published by Mr. Boyle in 1680, in the *Phil. Transf.* N<sup>o</sup> 196. (see *Phil. Transf. Abridg.* vol. iii. p. 346.); that of Kraaft; that of Brandt, in a collection of experiments and observations of Dr. Hooke, published by Dr. Derham in 1726; that of M. Homberg, in the *Ancient Memoirs* of the Academy, in 1692; and those found in the works of several chemists, particularly of Theickmeyer, Hoffmann, and Niewentyt. However, the operation continued in a great degree a secret till the year 1737, when a stranger came into France, and obtained a reward from the ministry for communicating his process, which was executed by Messrs. Hellot, Du Fay, Geoffroy, and Duhamel. Since the publication of M. Hellot's *Memoir*, the operation has been no longer a secret; though seldom executed, because it was rather curious than useful, and both troublesome and expensive.

The solid phosphorus was formerly prepared from urine in the following manner. Evaporate a good quantity of urine of beer-drinkers to the consistence of honey; cover it up in an earthen vessel, and set it three or four months in a cellar to ferment and putrefy. Mix two parts of sand, or powder of pot-sherds, with one part of this urine, and put it into a retort, fitted to a long-necked receiver, with two or three quarts of water in it. Distil it in a naked fire, in a reverberatory furnace; at first gently; after two hours, augment the fire gradually, till all the black fetid oil be drawn off. Raise the fire to the highest degree; upon which white clouds will come into the receiver, and fix, by little and little, on one side, in form of a yellowish skin; and another part will precipitate to the bottom in powder. Keep the fire thus violent for three hours, till no more fumes arise. Let all cool, and unloose the vessels; and, throwing more water into the receiver, shake all well about, to loosen what sticks to the sides. Pour the whole into a glass vessel, to settle.

The volatile salt will now dissolve in the water, and the

phosphorus and oil will sink to the bottom; then pour off the water, and gathering the remaining part together, put it into a glass vessel, with a little fresh water, and digest it in a sand-heat, stirring it from time to time with a wooden spatula.

By this means, the phosphorus will separate from the oil, and sink to the bottom: pour off the oil, and make up the phosphorus, while hot, into sticks for use.

Boerhaave gives us other ways of preparing phosphorus. Recent urine, he observes, digested three or four days in a tall glass, with a heat no greater than that of a healthy man, grows ruddy, fetid, and cadaverous; this digested urine, being put to distil in a retort, yields a clear, fetid liquor, then a yellow volatile salt, which evaporated to the consistence of a soap, and mixed with four times its weight of dry sand, and the distillation continued in a covered retort, there successively comes over, by greater and greater degrees of fire, a fetid brown oil, blueish fumes, and, finally, a gross shining matter, which sinks in water, and is the solid phosphorus.

To make it more easily, and to the best advantage, it may be proper to take a sufficient quantity of human urine, afforded by a person not much given to drink wine, and exhale it away in an open vessel to a rob, or the consistence of honey; then set it to putrefy for half a year, and, upon distillation, it will afford a large proportion of salt, after which, if six times its own quantity of sand, or brick dust, be added to the remainder, and the distillation be continued, as in the case last mentioned, the phosphorus will fall into the water. Or it may commodiously be prepared, by suffering the rob of urine to digest for two years in an open vessel in the open air; during which time, a slimy, feculent, unctuous, earthy matter, will fall to the bottom; which, being frequently washed with pure water, wherein it will not dissolve, will leave a white matter behind it, neither of an alkaline, acid, saline, or terrestrial, nor scarcely of an unctuous nature: and this is of itself a proper matter for the making of phosphorus by distillation with sand.

In order to preparing the phosphorus, and indeed most of the other preparations of urine, the first step is to reduce that liquor to the consistence of a rob or thick extract; those who have worked on this subject sufficiently know how abominably nauseous and disagreeable a task this is. The operator alone is not the person who is almost poisoned by it, but the whole neighbourhood is affected; and it is well known, that our Godfrey, who used to prepare large quantities of this substance, was always obliged to keep a house in the fields to perform this part of the process in.

There is an easy and excellent method proposed by Stahl for the performing of this troublesome business, by means of condensation by cold or freezing. There needs no more than to expose the proper quantity of urine to some frosty nights in winter; or at any time of the year to our ice-houses, or other places where ice is preserved all the year round. The frost will, in this case, affect a large part of the urine, but not the whole; and the liquid part being separated from the solid ice, it will be found that the watery parts alone have suffered the freezing, and that all the unctuous and saline ones are left behind in the unfrozen part, which is, by repeated freezings of its yet remaining aqueous parts, at length reduced to that sort of rob which is required for all the purposes of distillation, and that without any trouble or offensiveness, either to the operator or any body else. The power of condensation by freezing in this manner, extends to wine, vinegar, and all fermented liquors;

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liquors; but it operates differently on the several different ones, and is to be regulated according to their natures. The natural cold of our climate is seldom too great for any of the liquors we desire to condense; that is, it is never so great as to condense the whole into ice. It often is not sufficiently great to condense the aqueous part, even after ever so many repetitions. In this case, it may be proper to bring in the use of the common freezing mixtures, made with ice, or snow and salt. To suit the artificial degree of cold, in these cases, requires care and experience, and is almost as nice a point as the suiting of the degrees of heat in the operations of chemistry.

In 1743, Mr. Margraaf published, in the Memoirs of the Academy at Berlin, a new and excellent process for obtaining more easily and expeditiously, and at less expence than had hitherto been done, a considerable quantity of phosphorus. In his process, a kind of plumbum corneum is previously prepared, by distilling a mixture of four pounds of minium with two pounds of powdered sal ammoniac; the residuum after the distillation, or the plumbum corneum, is to be mixed with nine or ten pounds of extract of putrefied urine, boiled to the consistence of honey. This mixture is to be made slowly in an iron cauldron set upon the fire, and by frequently stirring the contents. Half a pound of powdered charcoal is then to be added, and evaporation is to be continued till the whole is reduced into a black powder, which is to be put into a retort, in order to extract from it, by a moderate and gradual heat, all the volatile products of urine, that is, volatile alkali, fetid oil, and an ammoniacal matter which adheres to the neck of the retort. In this distillation the heat is only to be raised so as to make the matter red-hot. After the distillation a black and friable residuum is left, from which the phosphorus is to be extracted by a second distillation, and a stronger heat. Before it is exposed to another distillation it may be tried by throwing some of it upon hot coals. If the matter has been well prepared, a smell of garlic exhales from it, and a blue phosphorical flame is seen undulating along the surface of the hot coals. This matter is to be put into a good earthen retort, capable of sustaining a violent fire, and which may be secured with a covering of clay and hair. Three quarters of the retort are to be filled with the matter which is to yield the phosphorus. It is to be placed in the common furnace for distillation with a retort; excepting that instead of being terminated by an ordinary reverberatory or dome, this ought to be terminated by the upper piece of an air-furnace, to which a tube is to be applied, the diameter of which ought to be from four to six inches, according to the size of the furnace, and the height from eight to nine feet. This apparatus, which Mr. Beaumé uses, is necessary for raising a sufficient heat, and for the convenience of throwing in a sufficient quantity of fuel through the door of the upper piece of the furnace. The retort ought to be well luted to a receiver of moderate size, pierced with a small hole, and half full of water. For this purpose ordinary fat lute may be bound on with strips of linen, dipped in a lute prepared with lime and whites of eggs. The hole in the furnace through which the neck of the retort passes ought to be well stopped with furnace-earth. Lastly, a small wall of bricks is raised betwixt the furnace and the receiver, to guard this vessel against heat as much as is possible.

All these preparations being made the evening before the distillation is to be performed, we are then capable of proceeding to this operation, which is very easy. The retort is to be heated by slow degrees during an hour and a half; and then the heat is to be increased till the retort be red-

hot, and the phosphorus begin to pass in luminous vapours: when the retort is almost of a white-red heat, the phosphorus passes in drops, which fall and congeal in the water at the bottom of the receiver. This degree of heat is continued till no more passes into the receiver. When a retort contains eight pints or more, this operation continues about five hours.

Mr. Margraaf's apparatus is somewhat different from that above described. He divides the whole quantity of matter from which the phosphorus is to be obtained into six small retorts, which he places in a furnace that he describes. The advantage of this division is, that if any accident happens to one retort, the whole matter is not lost; and as the retorts are smaller, a less heat is required. If, indeed, much phosphorus was to be made, this practice would be safe and excellent; but Macquer affirms, that the method above described of Mr. Beaumé is very convenient when a large quantity of phosphorus is not wanted, and that he has never seen it fail.

Phosphorus does not pass pure in this distillation, but is blackened by soot or coal, which it carries along with it: it may be easily purified, and rendered white and fine by a second distillation or rectification. This rectification is made in a small glass retort, to which is adjusted a small receiver half full of water. A very gentle heat is sufficient, because phosphorus once formed is very volatile: and as the fuliginous matters with which it is soiled were raised merely by the violence of the heat, they remain at the bottom of the retort in this distillation, and the phosphorus passes very pure.

The phosphorus is then usually divided into small cylindrical rolls, for the convenience of using it. This is done by putting it in glass tubes immersed in warm water. This very gentle heat is sufficient to liquefy the phosphorus, which is almost as fusible as suet. It takes the form of the glass tubes, from which it may be taken out when it is cold and hardened. That it may be more easily taken out of the tubes, these must be somewhat of the form of frustums of cones. All these operations ought to be made under water, to prevent the inflammation of the phosphorus.

Phosphorus is now usually procured by the following process. Calcine a quantity of bones till the whole of their inflammable matter is consumed, which will be indicated by their whiteness. After they are reduced to a fine powder, let 100 parts, by weight, be mixed with 500 parts of water, in a vessel of stone ware, or any other which sulphuric acid will not act upon. To the above mixture add, by degrees, 40 parts of sulphuric acid, constantly stirring the mixture with a stick or a glass rod. After the effervescence has subsided, let the mixture stand for a day or two, then decant off the clear liquor, which is to be preserved. Let the residuum be agitated with a quantity of fresh water, and thrown upon a filtre, adding the clear liquor which runs through to that decanted in the first instance. Let more water be poured upon the filtre till it comes through tasteless. This being added to the last, the whole will contain a super-phosphat of lime, with great excess of acid. In order to separate the phosphoric acid from the lime, the nitrat of lead is to be added. Phosphat of lead precipitates in the state of white powder, while the lime is dissolved in the nitric acid. The phosphat of lead being very ponderous, may be separated by decantation and repeated washing. When the powder is dried, mix it with one-eighth its weight of charcoal powder, and put it into an earthen retort. The common earthen retorts are seldom fitted for this process, being very liable to crack. The clay of which they are formed should be mixed with coarsely powdered cru-

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cibles, to render the texture of the substance when baked more open. The outside must be coated with white lead and flint, to form a glazing during the distillation of the phosphorus. Without this precaution the vapour of the phosphorus would escape through the pores of the vessel. The retort, with its contents, must be placed in an air-furnace, with a slit in the side to admit the neck of the retort. The fuel should be well burnt coaks, and the fire raised very gradually. The neck of the retort should be luted to an adopter, which is fitted to a glass receiver, previously filled with azotic gas. A small tube should proceed from another opening in the receiver, terminating in a pneumatic trough. This serves to carry off the elastic fluids which are disengaged in the process. During the first stage of the process carbonic acid is disengaged, which is afforded by the carbon combining with the oxygen of the phosphoric acid and the oxyd of lead. The charcoal always contains a portion of moisture, which is decomposed by the carbon. In the last stage of the process, when the phosphorus rises in the elastic form, a portion of it combines with the hydrogen of the water, forming phosphoretted hydrogen gas, which takes fire when it comes in contact with oxygen of the atmosphere. This spontaneous inflammation of the escaping bubbles, is a certain sign that the phosphorus is coming over. It is seen running down the adopter into the receiver, which contains a small portion of water for it to drop into. The mass which drops into the water is generally of a brownish, and sometimes a darker colour, and consists of phosphorus, containing some carbon, and is otherwise impure. When the apparatus is quite cold, it may be taken out, and placed in a glass funnel provided with a long cylindrical neck, about one-fourth of an inch in diameter, closed at one end with a cork. It is first filled with cold water, so as to cover the phosphorus. The whole is now immersed into hot water, which melts the phosphorus which is caused to occupy the interior of the tube, assuming a pale yellow colour, while that in the top part of the tube is of a darker colour, and contains the impurities. The pure part is broken into pieces, in which state it is sold. If the phosphorus after distillation be very impure, it should be distilled a second time from a glass retort, observing the same precautions in the receiver as in the first process. After this it may be strained through chamois leather under hot water.

The phosphat of lead may also be procured by adding nitrat of lead to urine. The latter substance contains a quantity of the phosphats of soda and ammonia, each of which give up their acid to the lead, forming phosphat of lead, which falls to the bottom of the vessel in the state of an insoluble white powder. This is doubtless the cheapest way of getting phosphorus.

Stahl supposed phosphorus to be a compound of muriatic acid with phlogiston; but it was afterwards proved by the researches of Margraaf, that muriatic acid could not be produced by burning phosphorus, nor could he succeed in forming phosphorus by treating muriatic acid with inflammable bodies. He found in the course of his experiments, what has since led to the overthrow of the phlogistic doctrine. The phosphorus gained weight by burning, and he called the substance resulting from the combustion phosphoric acid. Lavoisier, in a satisfactory manner, confirmed the facts of the above chemist, by burning phosphorus in oxygen gas. The diminution of the oxygen he found just equal to the increase of weight in the phosphorus after burning. Hence it was established, that phosphoric acid was a compound of phosphorus and oxygen.

Phosphorus, when perfectly pure, is of a pale yellow colour, having some resemblance to white wax. Like the

latter substance it softens by heat, and is so ductile as to be cut with a knife.

It is called "phosphorus fulgurans" from its corruscations; and "phosphorus smaragdinus," because its light is frequently green or blue, especially in places that are not very dark.

It is also called "solid phosphorus," from its consistence. It dissolves in all kinds of distilled oils; and, in that state, is called the "liquid phosphorus."

It may be ground in all kinds of fat pomatums; in which case it makes a luminous unguent.

So that the phosphorus fulgurans, smaragdinus, solid and liquid phosphorus, and luminous unguent, are all the same preparation, under different circumstances. See *FULGURATING Phosphorus*.

The specific gravity of phosphorus is about 1.77; the fusing point is 90° Fahr.; and it assumes the form of vapour at a little short of 600°.

When phosphorus is heated to 148 in the open air, it takes fire and burns with great brilliancy, owing to the rapidity with which it combines with oxygen. Very dense white fumes are produced, so as ultimately to nearly obscure the flame. If the combustion be made in a vessel, the fumes adhere to its sides, and become liquid, by attracting moisture from the atmosphere. A portion of red matter is left after the burning has ceased, which is probably a compound of phosphorus and carbon. The liquid which is formed upon the sides of the vessel has an acid taste, and consists of phosphoric acid, water, and probably a small quantity of phosphorus which has escaped combustion. When phosphorus is burnt in pure oxygen, the light produced is of such dazzling splendour as to give pain to the eyes. The combustion is by this means complete, and if the oxygen is in sufficient quantity, the whole is converted into phosphoric acid.

Lavoisier found that 100 grains of phosphorus took up 154 grains of oxygen, supposing the atom of oxygen to be 7, hydrogen being 1, agreeably to the numbers of Dalton. And considering the phosphoric acid as an atom of phosphorus

with two atoms of oxygen, we have  $\frac{154}{100} = \frac{14}{9.1}$ . Dalton

has fixed the atom of phosphorus at 9. From these data the atom of phosphoric acid will be  $9 + 2 \times 7 = 23$ .

When phosphorus is exposed to the air in small bits, it gives out a white smoke for some time, and is ultimately changed into a clear vivid oily liquid, which has an acid taste. In this process it combines slowly with oxygen, and consists of one atom of phosphorus with one of oxygen, or  $9 + 7 = 16$ . When phosphorus is made to undergo slight combustion, by melting it over the interior of a phial, with the presence of small quantities of air, the phosphorus assumes a reddish colour. By this change it is found to take fire with much greater facility, so much so that this process is resorted to in the construction of the common fire bottles.

From this and other facts it is probable that an oxyd of phosphorus exists with less oxygen than is contained in phosphorus acid. It doubtless is constituted by 2 atoms of phosphorus to 1 of oxygen, or  $2 \times 9 + 7 = 25$ . See *PHOSPHOROUS and PHOSPHORIC Acids*.

The action of the acids upon phosphorus is treated under the respective acids, but what has been omitted under *OXYMURIATIC Acid*, we shall introduce here.

The muriatic acid does not act upon phosphorus when the acid is in the gaseous form, but when presented in combination with some other bodies, it forms very curious combinations, which have been little noticed. We are indebted

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indebted to sir Humphry Davy for our knowledge of these facts.

When phosphorus is immersed in oxymuriatic acid gas, it burns with a pale flame, producing a white substance, which adheres to the sides of the vessel. The above chemist found that one grain absorbed nine cubic inches of the gas, and hence concludes that 1 of phosphorus combines with 6.8 of oxymuriatic acid, or, agreeably to the nomenclature of this philosopher, who considers the latter a simple body, *chlorine*. The number he gives to represent one proportion of chlorine is 67, that of oxygen being 15 and phosphorus 20; so that he concludes the compound formed by burning phosphorus in chlorine gas to consist of two proportions of chlorine equal 134, to one proportion of phosphorus equal to 20, or  $134 + 20 = 154$ , the number representing the compound. To this substance he has given the name of phosphorana. The advocates of the old hypothesis consider this compound as constituted by two atoms of muriatic acid, free from water, united to one atom of phosphoric acid, and agreeably to the common nomenclature it will be called a supermuriat of phosphorus. Dalton's number for muriatic acid is 22, for oxygen 7, and for phosphorus 9. Hence this substance will be constituted by  $2 \times 22 + 2 \times 7 + 9$ , or 58 oxymuriatic acid to 9 of phosphorus, but in fact 44 muriatic acid to 23 phosphoric acid.

The compound in question is described by its discoverer as being a snowy white substance. It is volatile at a temperature less than that of boiling water. It is capable of being fused under pressure, and then crystallizes in the shape of prisms which are transparent.

He states that "it acts violently upon water, which it decomposes." Its phosphorus combines with the oxygen, producing phosphoric acid, and its chlorine with the hydrogen, forming muriatic acid. The advocates for the old opinion equally well explained the action of water upon this substance, by supposing the same quantity of water to combine with the muriatic acid, which sir Humphry would state to be decomposed.

Another compound of this kind has been discovered by the same chemist, by distilling phosphorus through the powder of corrosive sublimate in a glass tube. A limpid fluid is obtained, which he states to be a compound of one proportion of chlorine with one proportion of phosphorus, or  $67 + 20 = 87$ . The properties of this compound are stated by sir Humphry as follows: it emits and fumes when exposed to the air, decomposing the aqueous vapour, and is converted into acid in the air without inflammation. In its pure state it does not redden dry litmus paper. The vapour from it burns in the flame of a candle. When poured into water, it is converted into muriatic and phosphorous acid, the hydrogen combining with the chlorine to form muriatic acid, and the oxygen with phosphorus forming phosphorous acid. This solution, being evaporated to the consistence of syrup, affords a very pure phosphorous acid combined with water, the muriatic acid having escaped. It becomes solid on cooling.

Sir H. Davy has called the above compound phosphorana.

By those of the common opinion, this substance is considered as a compound of pure muriatic acid and phosphorous acid. The phosphorus, on passing through the superoxymuriat of mercury, took an atom of phosphorus from the mercury forming phosphorous acid, which, combining with an atom of muriatic acid, formed the compound in question, leaving behind an atom of muriat of mercury (calomel), which consists of an atom of muriatic acid, with an atom of the first oxyd of mercury. By Dalton's numbers this substance is constituted by one atom of muriatic acid, 22

added to one of phosphorous acid, equal to  $9 + 7$  or 16, the whole being equal to  $22 + 16 = 38$ . All the phenomena stated above, which have been explained by sir Humphry's hypothesis, will be equally well explained by the old theory. The above ingenious chemist has pointed out a third compound of chlorine with phosphorus, which he supposes to consist of one proportion of chlorine with two of phosphorus, or  $67 + 2 \times 20 = 107$ . This, by the old doctrine, would be considered as composed of 1 of muriatic acid, 22 to 2 of phosphoric oxyd, equal 32, the whole being 52.

This substance was first obtained by Guy Lussac and The-nard, by distilling phosphorus and calomel. If its constitution be as above stated, 9 of phosphorus should be distilled with 196 of calomel.

Phosphorus combines with hydrogen, forming a gaseous compound called by some phosphoretted hydrogen, and by others more properly phosphoret of hydrogen. Several circumstances shew the affinity between phosphorus and hydrogen to be very slight, particularly its liability to be decomposed even by agitation with water. The following is the process recommended by Dalton for procuring it. To two ounces of dry hydrat of lime, or lime which has just taken as much water as is required to slack it, add 50 grains of phosphorus in small bits. Let these be put into a glass retort, which has been previously filled with nitrogen gas. Without the latter precaution the presence of oxygen would decompose the gas intended to be obtained. Let the neck of the retort be connected with an hydromuriatic trough, and apply the heat of a lamp, which brings over the gas. The lime is here more than is necessary, which is no inconvenience. The absolute quantities which are engaged in the process are, 1 atom of hydrat of lime =  $8 + 24$ , and 2 atoms of phosphorus =  $2 \times 9 = 18$ . The water of the hydrat of lime is decomposed. The oxygen combines with one atom of phosphorus, forming phosphorous acid, which afterwards combines with the lime. The hydrogen combines with the other atom of phosphorus, forming phosphoret of hydrogen, which comes over in the form of gas. In this state it takes fire spontaneously in the open air, or in contact with oxygen. The phosphorus is easily separated by the electric spark, and even by standing over water, leaving the hydrogen pure, and occupying the original volume of the gas. This latter effect taking place partially, has given rise to the opinion of phosphorus combining with hydrogen in different proportions. We can hence explain the assertion made by sir H. Davy, in which he says he has obtained phosphoretted hydrogen gases of different specific gravities, from 4 to 7; hydrogen being 1.

The composition of this gas is easily inferred from its specific gravity, which Dalton states to be 10.5, hydrogen being 1. Hence if 1 of hydrogen takes up 9.5 of phosphorus without any change of volume, it will make the specific gravity as above. By theory, 9 of phosphorus should combine with 1 of hydrogen, when 1 atom of the former combines with 1 of the latter. We may hence conclude that an atom of this gas in a state of purity is  $1 + 9 = 10$ .

To confirm this, Mr. Dalton found that 1 measure of this gas to 1.5 oxygen produced phosphoric acid; and 1 measure to 1 produces phosphorous acid. We are indebted to sir Humphry Davy for the discovery of a new compound of phosphorus and hydrogen, which he obtained by exposing the solid hydrat of phosphorous acid to heat in a retort. An elastic fluid is produced, having a less disagreeable smell than the phosphoret of hydrogen, already described. It does not, like the latter, explode spontaneously. When heated to  $300^\circ$  Fahrenheit with oxygen, it detonates with violence.

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violence. It also explodes in oxymuriatic gas with a white flame. This chemist supposes its specific gravity to be about 12, hydrogen being 1.

When heated in potassium, its volume is doubled, and the gas produced is pure hydrogen. When sulphur is sublimed in it, the volume is doubled, and sulphuretted hydrogen gas produced.

He found that 3 in volume of this gas took up more than 5 of oxygen. He concludes its composition to be nearly 2 of hydrogen to 10 of phosphorus, by weight. According to Dalton's numbers it will consist of an atom of phosphorus to 2 of hydrogen, or  $9 + 2 = 11$ . If its volume be doubled by taking away its phosphorus, which is the case in the experiment with potassium, its specific gravity will be increased by 1 compressed into  $\frac{1}{2}$ , which will give a specific gravity equal to 2: this added to 9, the weight of the phosphorus, will give  $9 + 2 = 11$ , which is very near to Sir Humphry's experiment. In the experiment where it combines with the sublimed sulphur, the volume is doubled, and two atoms of sulphuretted hydrogen are formed, one of which being equal to the original volume, will make the specific gravity of this gas equal to that of sulphuretted hydrogen, which is about 14, hydrogen being 1. The mean of these will be  $\frac{11 + 14}{2} = 12.5$ , which comes very near to Sir Humphry's statement of the specific gravity, and strongly confirms the rest of the facts relative to it.

The oxygen required for its total absorption will be 28 to 11 by weight, and  $\frac{28}{11} \times \frac{12}{14} = \frac{24}{11}$ , or 2 to 1 by measure nearly. This is obtained by multiplying their ratios of weight by the inverted ratio of their specific gravities.

Phosphorus combines with sulphur by melting them together in a glass tube, from which oxygen is excluded. The compound is more fusible than either of the elements. Sir Humphry Davy found that a compound of these bodies in the proportion of 3 of sulphur to 4 of phosphorus, is fusible at 40° Fahrenheit. When solid, its colour was of a yellowish-white. These bodies, like all others, must produce most complete compounds in certain definite proportions dependent on the ratio of the weight of their ultimate atoms. Atom to atom, their proportions will be 9 to 13. The compound above alluded to will be 2 atoms of phosphorus to 1 of sulphur, or  $18 + 13 = 31$ . The most remarkable properties possessed by these compounds are their increased fusibility, and their taking fire at a lower temperature than phosphorus. This latter property has been taken advantage of in making the common fire-bottles. Their proportions for this purpose are generally about 2 phosphorus and 1 sulphur. This is nearly 3 atoms of phosphorus to 1 of sulphur, which would be  $3 \times 9$  to  $13 = 27$  to 13.

Dr. Priestley has made many experiments with phosphorus, in different kinds of air; and has found, that it smoked and gave light in the acid air, just as it would have done in common air confined, without being sensibly wasted for twelve hours, and with a very inconsiderable diminution of the bulk of the air; in alkaline air it gave no light and made no lasting change in its dimensions; in nitrous air, it gave no light, nor did it lessen its power by diminishing common air, and the phosphorus remained unchanged; and after having remained a day and two nights in vitriolic acid air, it produced no sensible effect, and gave no light.

Dr. Fordyce has suggested the following easy method of reducing phosphorus to powder: take phosphorus of urine two drachms; put it into a four-ounce phial; pour upon it three ounces of water; heat it gently by immersion in warm water, till the phosphorus melts; shut the phial with a cork;

take it out of the water, and shake it briskly till it be cold; and the phosphorus will be found in powder. A receiver may be lined with this powder by adding a very small quantity of water to it, and then making the powder to adhere to its internal surface, by gently inclining and turning the receiver round. Macquer's Chem. Dict. art. *Phosphorus*, and Priestley's Experiments and Observations on Air, &c. Phil. Transf. vol. lxi. part ii. p. 504, &c.

**PHOSPHORUS, Properties of Solid.** 1. With this phosphorus one may write on paper as with a pencil, and the letters will appear like flame in the dark; yet, in the light, nothing will appear but a dim smoke. This is occasioned by the oxygen of the atmosphere combining slowly with the phosphorus.

If the letters written with this phosphorus are warmed by the fire, they presently become dark lines, which continue upon the paper like ink.

2. A little piece, rubbed between two papers, takes fire instantaneously, and if care be not taken in the management of it, there is danger of burning the fingers, the phosphorus being exceedingly inflammable.

3. Its burning is very vehement, and penetrates deeper into the flesh than common fire; and it is very difficult to be extinguished.

Dr. Slare, in order to determine whether air contains the pabulum of flame, as some have supposed, placed a large piece of phosphorus in a receiver; but upon exhausting it, he found that it became more luminous, and that upon admitting the air it returned to its former state. This property was also ascertained by several experiments of Mr. Hauksbee.

M. Cassini happening to press a piece in a cloth between his fingers, the cloth immediately took fire; he endeavoured to put it out with his foot; but his shoe caught the flame, and he was obliged to extinguish it with a brass ruler, which cast forth rays in the dark for two months after.

The solid phosphorus ceases to shine and never spoils, provided it be kept in a phial full of water; but if any part of it emerge, it will shine, though the glass be hermetically sealed; and will continue shining in a large glass without water for several days, with very little diminution of its light or weight; and even when immersed in water, it will sometimes make very bright and vigorous corrufcations in the air; that in form of an unguent, does not keep so well; and the liquid phosphorus worst of all.

The liquid phosphorus is best made by digesting in horse-dung, a little bit, or some scrapings of the solid kind, for two days, in oil or essence of cloves, oil of turpentine, or the like. After the dissolution, the oil will be so impregnated with it, that, upon opening the bottle, the matter will appear on a flame.

**PHOSPHORUS, Experiments with Liquid.** By washing the face, hands, or the like, with liquid phosphorus, Dr. Slare tells us they will be made to shine very considerably in the dark, and the lustre thereof will be communicated to adjacent objects, yet without any offence to the skin.

As soon as the candle is brought in, the shining disappears, and no change is perceivable.

This phosphorus emits frequent flashes like lightning, even when close stopped, especially in warm water. Hence Mr. Boyle takes occasion to draw a parallel between lightning and phosphorus. Phil. Transf. Abr. vol. iii. p. 348, &c. Hauksbee's Physico Mech. Exper. p. 122. In some cases animal sweat, which is similar to urine, has been observed to be phosphoraceous, without any preparation. An instance of this kind is related of a person who used to eat great quantities of salt, and who was a little subject to the gout, after sweating with violent exercise. Stripping himself in the

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the dark, his shirt seemed to be on fire, and a urinous smell was perceived, similar to that which issues from cabbage much salted and strongly fermenting. Act. Cæsariensis, vol. v. p. 334.

**PHOSPHORUS, Bolognian, or Bononian.** The second kind of artificial phosphorus, is a preparation of stone called the Bononian stone, from Bologna, a city in Italy, near which it is found.

The first who undertook to make this stone luminous, was a chemist of that city, called Vincenzo Casciarolo. Poterus, Licetus, &c. have described the process; but mistakenly. M. Homberg, who made a journey to Italy, expressly to learn the preparation, first communicated the same to M. Lemery, who published it in the seventh edition of his chemistry. (See *BONONIAN Stone*.) Under that article, the reader will find some account of the discovery of this stone, and of the method of preparing it. We shall here subjoin some farther particulars on this subject, chiefly extracted from the dissertations of M. Margraaf. The Bolognian stone, he says, is soft, friable, heavy, crystallized, and incapable of effervescing with acids, before it has been calcined in contact with fuel, and with a free access of air. These qualities have induced him to class it among the heavy fusible spars, which, by a preparation similar to that for the Bolognian stone, are rendered phosphoric. After analysing these substances, he concludes that all contain a vitriolic acid, united to an alkaline or calcareous earth. In order to render these stones phosphoric, such of them ought to be chosen as are the clearest, but crystallized, most friable, most heavy, which exfoliate when broken, and which contain no heterogeneous parts. They are to be made red-hot in a crucible, and reduced to a very fine powder in a glass mortar, or upon a porphyry, and not in a copper mortar, which will obstruct the success of the operation. The powder thus obtained, is to be formed into a paste with gum tragacanth, and divided into cakes as thin as a knife. These are to be dried by a gradual heat. An ordinary reverberatory furnace is to be filled to three quarters of its height with charcoal, and the fire to be kindled; upon this charcoal the flat surfaces of the cakes are to rest; and more charcoal is to be placed above them, so as to fill the furnace, which is then to be covered with its dome, the tube remaining open: all the coal is to be consumed, and the furnace left to cool. The cakes are then calcined, and are to be cleansed from the ashes by blowing upon them with bellows. He farther observes, that after this calcination through the coals, if the stones be exposed to a stronger calcination during a full half hour under a muffle, their phosphoric quality will be rendered stronger. Ac. Berlin, 1749, and 1750.

This phosphorus has not any sensible heat, and only becomes luminous after being exposed to the sun, or the daylight; in which state it resembles a burning coal, and preserves its light five or six minutes in the dark, especially if the person observing it has been some time in the dark, or has shut his eyes, that the pupils may be sufficiently expanded; during which time the light gradually dwindles; and, to recover the shining, it must be exposed afresh to the light.

**PHOSPHORUS, the Hermetic, or Phosphorus Balduini,** which makes the third kind, and properly belonging to the same class with the former, is a preparation of English chalk, with aquafortis, or spirit of nitre, by the fire. See *BALDUINI'S Phosphorus*.

This makes a body considerably softer than the Bolognian stone; but it has all the qualities of it. It has its name from its inventor Baldwin, a German chemist, called *Hermes*, in the society of the *Naturæ Curiosorum*; whence

its other name *Hermetic*. It was discovered a little before the year 1677.

This phosphorus of Baldwin is exactly similar to those made with Bolognian stone and phosphoric spars, differing only in the kind of acid which it contains. It is evidently a nitre with a calcareous basis, and in calcination acquires its phlogiston from the nitrous acid, the chalk also containing some of this inflammable principle. It is observed, however, that this is not so good a phosphorus as the Bolognian; it is not so luminous, it does not retain the light so long, it soon loses its virtue, and never recovers it again. Acad. Par. 1693, p. 271.

The process for making this phosphorus, though Baldwin gave no direction for it, nor so much as mentioned the materials, was communicated to the Royal Society, in 1679, by Dr. Slare, and published by Grew, in his *Mus. Reg. Soc.* p. 353; and is as follows: Take good firm chalk, ignite it in a crucible, and then powder it; put into a pint, or half a pint of strong spirit of nitre, *cochlearim*, as much of the powdered chalk as will serve well to satiate it, *i. e.* till it becomes sweetish, and makes no effervescence upon the injection of the chalk. Then dilute this liquor with fair water, filtre it through a paper, and so evaporate it in a large glass, or glazed vessel, or good Hessian crucible, to a dry salt. The preparation may be performed in four hours.

To this class we may also refer some other phosphori, enumerated in the sequel of this article. As the

**PHOSPHORUS, Ammoniacal,** composed of sal ammoniac and lime, which Mr. Homberg first discovered.

The method of preparing it is this: Take one part of sal ammoniac in powder, and two parts of lime extinguished by lying in the air: mix them exactly together and fill a crucible with the mixture; set it in a small melting heat. As soon as the crucible grows red-hot, the matter in it will melt, and it must be stirred with an iron rod, lest it swell over the edges of the crucible: as soon as the whole is melted, pour it into a copper basin; it will appear of a greyish colour and vitrified, and if it be struck upon with any hard body, there will be seen a fire all over the place where the blow was given. As this matter is brittle, however, and the same mass will not serve often for the experiment, the best method is to dip iron rods in it while melting, and these will be covered with the matter, and will answer the purpose easily and often. Mem. Acad. Par. 1693.

This is a combination of quick-lime with the acid of sal ammoniac.

**PHOSPHORUS, Antimonial,** is the name of a substance having the qualities of the phosphorus discovered by Mr. Geoffroy, in his experiments on antimony. This gentleman had prepared a soap from pot-ashes, quick-lime, and oil, with which he made several experiments on antimony; among others, he was desirous, by means of this, to reduce some diaphoretic antimony, which he had before made from two parts of the regulus of antimony, and three parts of nitre; but, instead of the reduction which he was labouring after, his operation afforded him a much more singular phenomenon: the result of them being a phosphorus, which he had never thought of; a matter which, after having remained perfectly quiet while close stopt down, took fire as soon as ever it was exposed to the air; and that with a violent detonation, and darting every where a shower of fire.

It is easy to see, that there are in the preparation all the requisites for such an effect; nitre, charcoal furnished by the burnt soap, and sulphur both from the soap and from the regulus of antimony; and to all these a sort of calx, either

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either from the soap, or from some earthy parts of the antimony. It is easy to conceive, that all these substances, coming into a mixture together, should be ready to catch fire and blaze, upon a proper application; but it is not less difficult to account for the effects being produced merely by the air, after the whole had been for a long time in a state of rest.

The method of preparing this new species of phosphorus is this: Mr. Geoffroy mixed two ounces of his soap with one ounce of this diaphoretic antimony; this mixture, being put by little and little into a red-hot crucible, took fire, and swelled very much; after it had done flaming, the mass subsided, and became a red or fire-coloured substance, of an even surface, but still throwing up a vast quantity of blueish-green luminous vapours; and all this regularly happened on every fresh throwing in of the matter, without the least variety. When the whole quantity was thrown in, and had ceased to give any flame or luminous vapour, it remained in the crucible in the form of an inverted mushroom, being hollow, very porous, and of a black colour. When the crucible was taken out of the fire, the edges of this substance were beaten down into the middle, and the whole covered with an ounce of fresh soap; when this last soap was burnt, and a small blueish flame appeared upon the surface of the mass, the crucible was covered with a lid, and a large quantity of charcoal laid upon it, and the fire blown up very briskly by an hundred blasts of the bellows, or thereabouts; but, notwithstanding the fierceness of the fire, there was no fluid scoria formed, but the whole mass remained spongy and porous; the fire was then suffered to go out, and the crucible placed in the corner of the laboratory at rest for five hours. In the evening, when the crucible was perfectly cold, Mr. Geoffroy went to examine the matter, and a servant went to uncover the mass, by removing its surface with an iron instrument; but the moment the air was admitted, the whole mass took fire, burning with a very considerable noise, and darting its flames every way to a great distance.

Mr. Geoffroy repeated the process several times, and always with the same success, whether he used his own diaphoretic antimony, or that made in the common manner. The great caution to insure the success, seems to be taking care of not carrying the fire too far before the addition of the last quantity of soap. *Mem. Acad. Scien. Par. 1736.*

*PHOSPHORUS of the Bern-stone*, is a name given to stone (which, when heated, becomes a sort of phosphorus) from Bern, in Switzerland, the place where it is found.

This substance was sent to the members of the Royal Academy at Paris, by M. Bourguet, and referred by them to the examination of M. du Fay, whose account of it is published in *Mem. Acad. Paris, 1724.*

The Bern-stone is of a moderate hardness, considerably pellucid, and usually colourless, or whitish, though sometimes with a tinge of green, yellow, or some other colours: it is composed of a number of plates or flakes, laid over one another in the manner of the island crystal; and, therefore, like that body is plainly a spar. It breaks into several faces, and has different angles; but of a somewhat determinate measure, the acute ones being of sixty degrees, and the obtuse ones of one hundred and twenty.

This stone, when heated at one of its angles with the flame of a lamp or candle, splits by means of the flame's insinuating itself into the interstices of the plates that are less firmly united; and these separate, and some fragments usually fly off with considerable violence. One of these pieces, carried into an obscure place, appears surrounded

with a blue flame, which lasts about a minute. And it is to be observed, that these pieces which fly off have all the shape of an irregular pyramid, with an uneven base. If this stone be put into a crucible and surrounded with coals, it becomes a very beautiful phosphorus. The whole bottom of the crucible is seen, even though it be in broad daylight, shining with a bright and beautiful blueish white; and if it be carried into a dark place, the light is seen much more beautifully. If, after it is cold, it be again heated in a crucible, in the same manner, it shews the same bright appearance. After this, if it be tried a third time, it does not shine at all. According to all these phenomena, the effects of fire upon this stone seem to depend on a sulphur contained in it, probably of the same nature with that which enters the composition of the metals. This may, by means of a heat, such as that given by the candle or in the crucible, disengage itself so far from the body of the stone as to take fire; and when it has burnt so long as to consume itself, the luminous property of the stone seems to cease.

The coloured gems are crystals of a peculiar kind, tinged with what has been called the sulphur or phlogiston of metals: this sulphur gives them their colour, and consequently it ought to give them the properties of the Bern-stone, if it were not too fixed to be dissipated in the same easy manner, and to take fire in the dissipation. And it appears, on trial, that the bastard emeralds of Auvergne and other places, the matrix of the amethyst, the fragments of some of the accidental jaspers, the hyacinths, and some sort of rubies, are all phosphoruses of the nature of the Bern-stone, but with different degrees of brightness. The mother of the emerald, the yellow jasper, the water sapphire, the malachite, the opal, and the garnet, have none of them any of this property.

Since the same sulphurs, which take fire in the Bern-stone, are what give colour to these other stones, it should seem, that those, which are not of this phosphorus kind, nor give a light after being heated, should not lose their colours in the fire; and this is found to be true in the garnet, which does not lose any part of its colour, nor is it at all luminous; whereas the hyacinth, and some of the jaspers and other stones, which lose a part of their colour, not the whole, in the fire, become also in part luminous, or more so, in degree, according to the quantity of colour which they lose. This, however, is no certain rule, since the mother of the emerald, the topaz, and some other stones, lose all their colour, and yet are not at all luminous. The reason of this seems to be, that the sulphurs are driven out of these stones so slowly, and in such minute quantities, that they are not at any time collected into body enough to be capable of flame. There is nothing to be objected as to the Bern-stone shining; though they are usually white, they may possess no smaller portion of sulphurs than the coloured stones; only in those the sulphurs may be colourless, or white in themselves. It may be possible also, that the sulphurs in a stone of this kind may be dispersed in such small molecules, as not to form a body sufficient to give any colour; but when collected, in order to be driven off in the fire, they may then be sufficient in quantity to give a blue tinge to the flame.

The island crystal, which is also a species of spar, and which greatly resembles this Bern-stone in many particulars, flies to pieces also in the same manner, on being heated; and when carried into the dark, this also gives some sparks of light, but they are few in number, and loosely scattered over the surface: when this stone is burnt a little in the crucible, there is some small appearance of flame, with a  
smell

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smell of sulphur, and the matter in the bottom of the crucible is found shattered to pieces; but all the pieces are regular parallelepipeds, as was the original mass.

It is to be observed, that the Bern-stone, and others of the same kind, which only shine in the dark, and that only for a few minutes, when first taken out of the fire, are, properly speaking, endued with no other luminous quality than that of a burning coal; but their light, having been generally unobserved, and requiring darkness to shew it, has obtained for them the specious title of *phosphori*.

PHOSPHORUS, *Canton's*, is an artificial phosphorus, the method of preparing which was discovered by the late ingenious Mr. Canton, and published in the *Phil. Trans.* for 1768, vol. lviii. p. 337, &c.

This is much superior to any single natural substance, and has the advantage of being very easily and cheaply prepared. The process is as follows: calcine some common oyster-shells, by keeping them in a good coal fire for half an hour; let the purest part of the calc be pulverized, and sifted; mix with three parts of this powder one part of the flowers of sulphur; let this mixture be rammed into a crucible of about an inch and a half in depth, till it be almost full; and let it be placed in the middle of the fire, where it must be kept red-hot for one hour at least, and then set by to cool: when cold, turn it out of the crucible, and cutting, or breaking it to pieces, scrape off, upon trial, the brightest parts; which, if good phosphorus, will be a white powder, and may be preserved by keeping it in a dry phial with a ground stopple. The quantity of light which a little of this phosphorus gives, when first brought into a dark room, after it has been exposed for a few seconds, on the outside of a window to the common light of the day, is sufficient to discover the time by a watch, if the eyes have been shut, or in the dark, for two or three minutes before. By this phosphorus celestial objects may be very well represented; as Saturn and his ring, the phases of the moon, &c. if the figures of them, made of wood, be wetted with the white of an egg, and then covered with the phosphorus. And these figures appear to be as strongly illuminated in the night, by the flash from a near discharge of an electrified bottle, as by the light of the day. This phosphorus receives no injury from being exposed to the direct rays of the sun, which is the case of some of the more delicate kinds, as Beccarius has remarked, and Lemery supposed with all. However, it cannot be exposed to moisture without losing its property of imbibing and emitting light, and also its whiteness. Mr. Canton found, that it was more affected by mixture with spirit of wine than with ether. It had been long known, that heat promotes the expulsion of the light, which has been formerly imbibed by these phosphori. Mentzel, who wrote soon after the discovery of Baldwin's phosphorus, asserted, that it had the property of becoming luminous by heat only; the same fact was observed by M. du Fay; but the principle on which it depended was discovered by Beccarius, M. Margraaf, and Mr. Canton, independently of one another. Beccarius was first of opinion with Mentzel, that the light was produced by heat; but finding by repeated trials, that, without previous exposing to the light, heat had no effect, he relinquished that opinion. M. Margraaf fell at first into the same mistake with Beccarius; but he afterwards observed, that the phosphorus would not shine by being placed upon a hot furnace, unless it had been exposed to the light two or three days before. Upon the whole, he concludes, that the light is held in this substance by attraction, and afterwards expelled by heat. Mr. Canton also, without any knowledge of the observations of Beccarius

and Margraaf, found by a variety of experiments, that, when his phosphorus had imbibed light, and had emitted all that it could in the common state of the atmosphere, it would emit more upon the application of heat, but that a continuance of the same degree of heat would only make it luminous for a certain time. Whence he infers, that there is a strong attraction between light and the particles of natural bodies: and that the strong vibrations into which heat throws them, compels them, as it were, to quit their hold of each other; and the light, which this phosphorus gives, by being heated to a certain degree, appears to be caused by its throwing off adventitious particles, and not by any of its own; since its light will decrease, and be entirely gone, before the phosphorus be hot enough to shine of itself, or to emit particles of light from its own body. Lemery and Mufchenbroeck have observed, that the Bolognian phosphorus imbibes less light when hot than cold; because it appears less bright when carried into a dark room; but this circumstance is accounted for by Mr. Canton, by its parting with its light faster when hot than when cold, and, therefore, parting with more in the time of the conveyance from one place to another: and this, he also says, seems to be the cause why the Bolognian phosphorus never appears so bright after it has been illuminated, and, consequently, in some measure heated, by the direct rays of the sun, as after it has been only exposed in the shaded open air to the common light of the day. However, there is reason to imagine, that the same degree of heat, which disposes the phosphorus to throw off the light after it has been imbibed, must likewise render it indisposed to receive it. For an account of the result of Mr. Canton's experiments on this substance in favour of the materiality of light, see LIGHT.

PHOSPHORUS, *Wilson's*, a substance belonging to the class of solar phosphori, which Mr. B. Wilson discovered, and which is one of the simplest and most powerful of all the phosphori belonging to this class. The method of preparing it is as follows: Select twenty oyster-shells, the thicker the better; then take from a fire that is briskly burning, most of the flaming coals, but not all of them; strew the shells over the surface, and replace the coals that have been taken off. In about an hour's time take out the calcined shells, breaking them as little as possible; and after exposing them for a few minutes to the light, they will be found to have acquired a high degree of phosphorescence, glowing in the dark, in a very beautiful manner, with most of the prismatic colours. If the shells are sufficiently heated in a close crucible, they will exhibit prismatic colours, chiefly blue and green, though not so bright as by the former method. If the calcination is effected in an iron crucible, all those parts of the shells that are in contact with the sides of the crucible will glow with a red light. The contact of inflammable matter, and particularly charcoal, with the shells during calcination, appears very much to contribute to the brilliancy of the phosphorus: hence it is, that if the shells are calcined in a crucible in contact with thin plates of steel, the phosphorus thus produced will be much more bright, and of more various colours, than where plates of iron are employed; and, on the other hand, if flat pieces of charcoal are made use of, the intensity of the colours, especially the blue, green, and red, is far greater than in those produced by steel.

The colour of the light, in most phosphori that have been presented to the light, and that are then carried into the dark, is white or reddish-white; but in Wilson's phosphorus, not only white colours, but all those of the prism make their appearance, sometimes being all united in a single

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single specimen, at other times each piece exhibiting only one or two colours. In every species of solar phosphorus, the light, after having been extinguished, may be increased for any number of times, without the smallest apparent diminution of brilliancy, by simple exposure for a few seconds to the light. If the phosphorus be moderately heated, when it is presented to the light, its luminousness will be very sensibly augmented. If a common box smoothing-iron, heated as usual, be placed for half a minute on a sheet of dry white paper, and the paper be then exposed to the light, and afterwards examined in a very dark closet, the whole paper will be luminous, and the part on which the iron box had stood will be much more shining than the rest. It is observed that the variation of the temperature produces remarkable effects on phosphori, *after* having been exposed to the light. If a thin glass tube be filled with Canton's or Wilson's phosphorus, and as soon as it is brought into a closet made very dark, be plunged half way into a freezing mixture for a few minutes, it will be found, on again withdrawing the tube, that the cold portion is much less luminous than the other; and if the freezing mixture has been sufficiently powerful, it will be entirely extinguished. The luminous property in this case is suspended, and not exhausted: for as the dark part of the tube begins to acquire the temperature of the surrounding air, its light will revive, and it will remain longer than that of the other part of the tube, in proportion to the time of its being kept in the freezing mixture. From hence it would seem to follow, that at a very low temperature the present class of solar phosphori would cease to exist. As cold retards, heat quickens the emission of light from phosphoric substances. If the tube just mentioned be dipped half way into boiling water, the immersed part will exhibit a great increase of lustre, which in a minute or less time will be succeeded by total darkness; while the unheated part will shine for a much longer time, though with less splendour. If any one of these phosphori, kept in the dark till it is totally extinguished, be placed, without being again exposed to the light, in the warm hand, its luminousness will for a short time be renewed; and if, when the hand fails to produce the effect, it be placed in boiling water, a further emission of light will take place; and, finally, it may be entirely exhausted of its light, by being placed on a metallic plate, heated nearly to redness. Hence it appears, that there are two causes of the extraordinary brightness exhibited by solar phosphorus, when strongly heated immediately on being introduced into the dark room: in the first place, there is a greater quantity of light actually given out; and, secondly, the whole is discharged in perhaps a twentieth of the time in which even a part would be exhausted at the common temperature.

Two theories have been proposed, in order to account for the origin of light in these substances. One theory ascribes it simply to the solar light, which they had previously imbibed; and the other attributes it to the inherent light of the phosphorescent substance itself. The advocates of the first theory allege, that previous exposure to the light is necessary to the phosphorescence of these substances, and that the period of its greatest brilliancy is the moment of its being placed in the dark, where it regularly and rapidly diminishes till it becomes extinct. Beccaria's experiment is also urged in favour of this theory: he found that those phosphori, which in the usual circumstances emit a white light, give out coloured rays in the dark, corresponding to those which they receive from the sun, with the interposition of a plate of coloured glass. The accuracy of this fact has been doubted. Du Fay's experiments, made before those of

Beccaria, tend to a directly opposite result; the light emitted by the phosphorus being of the same tint, whatever was the colour of the glass through which the rays passed to the phosphorus. Others have failed in repeating Beccaria's experiments. Mr. Wilson, in particular, had made many experiments in reference to this point, which, with their results, he has detailed in his *Treatise on Phosphorus*. His facts would lead us to conclude, that the phosphorescent light is not merely that which was previously imbibed from the sun; and yet they do not prove that it is properly inherent in the phosphoric substance itself.

The solar phosphori may be excited not only by the rays of the sun, but by any other light that is sufficiently powerful; and those phosphorescent substances which are most brilliant, in consequence of exposure to the light of day, are most easily excited, as we might naturally expect, by other luminous bodies. However, the rays of the moon, even when concentrated in a lens, appear to be incapable of illuminating even the most sensible kinds of phosphori. The light of a single candle, or the momentary flash from the explosion of a little gunpowder, or from an electrical discharge, are sufficient to render Wilson's phosphorus, when well prepared, very visibly luminous. It is not very certainly known what is the effect of the different gases on the luminous property of these bodies. Aikin's *Dict. of Chem. and Min.*, art. PHOSPHORUS. See LIGHT.

PHOSPHORUS, *Fœcalis*, a very fine kind of phosphorus, exhibiting many wonderful phenomena, and prepared from human dung mixed with alum.

Mr. Homberg, who was the inventor of it, gives the method of preparing it in the following manner: take four ounces of human dung newly made, mix it with the same quantity of roach alum grossly powdered; put the mixture into a small iron ladle, capable of holding about a pint; set it over the fire in a chimney, and it will melt together, and become as fluid as water; let it boil gently over a small fire, continually stirring it with an iron spatula till it is dry; it will then be difficult to stir, but it must be kept stirring about, and all the lumps it runs into must be broken, and what adheres to the sides of the ladle stirred in and blended with the rest; this must be continued till it is perfectly dry, and the ladle must be now and then taken from the fire, and the matter stirred about in it, that it may now grow red-hot. When the whole is thus perfectly dried, it will still be in little lumps, and when cold it must be rubbed to powder in a metal mortar; it must then be put into the ladle, and set over the fire again; it will then become a little moist again, and run into clods and grumes, but it must be again stirred till dry; when cold it is to be powdered again, and a third time put into the ladle; and when perfectly dried this time, it is to be laid by in a paper in a dry place: thus is the first or preparatory operation finished.

Take two or three drams of this powder, put it into a small matras, capable of holding an ounce and a half of water, and which has a neck six or seven inches long; put a paper stopper lightly into the neck of the matras; then take a small crucible of three or four fingers breadth high, put two or three spoonfuls of sand into it, then set the bottom of the matras on the sand, and take care that no part of it touches the sides of the crucible; fill up the rest of the crucible with sand, and let the whole body of the matras be covered with it; then set the crucible in one of the common little earthen furnaces, and make a charcoal fire about it; for the first half hour let the coals only reach up to the middle of the crucible, but afterwards lay them up to the rim in it; continue this fire about half an hour, or till the powder within the matras is red-hot; then pile up more charcoal

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charcoal above the rim of the crucible, and continue this fire an hour, after which let the whole cool. There will arise a large quantity of fumes during the operation, and they will often throw out the stopper of the matras; but this must be replaced, and the fire a little abated in that case; when these fumes cease, the fire may be raised without hurting the process, when the crucible is so cool that it may be taken out of the furnace without burning the hands. This is to be done, and the matras is to be half raised out of the sand, to make it bear the cold by degrees, and its mouth must then be stopped closely with a cork, instead of its paper stopper. If, on shaking the matras about, the matter falls into powder, it is a proof that the operation has been well performed; but if it hang together in form of a cake, it is a sign that the matter was not well roasted in the ladle before the putting it into the matras.

When the operation has been well performed, and the matter is in powder in the matras, pour out a small quantity of it on a piece of paper, and immediately stop the matras again; the powder upon the paper will immediately fume and take fire, burning the paper, and any other combustible matter that is in the way. If there has been too much of the powder poured out of the matras, it must not be returned in again; for though that should be done before it begin to smoke, yet it will certainly set fire to all that is in the matras: from this it may be easily seen also, that the matter cannot be emptied out of the matras into a phial, but must always be in the vessel in which the calcination was made.

If too much alum be used, the powder will not take fire at all: it will be of different colours, according to the vessel the first calcination was made in, and according to the degree of fire that was used; hence it is sometimes black, sometimes brown, sometimes red, green, yellow, or white.

It takes fire equally well in the day-time and in the night, and that without the mixture of any other substance, or without the least rubbing, or any other circumstance beside the mere exposure to the air. In this it differs from all the other known artificial phosphori; for that of urine requires a small degree of heat, in order to its burning; the smaragdine phosphorus requires a considerable degree; the Bononian stone does not shine, except after having been exposed to the day-light; and all the others require violent rubbing, or a smart blow, to produce their light.

If it be desired to keep this powder good for any time, it must be put in a dry place where there is not too much heat; the mouth of the matras must be kept close stopped, and its body covered with paper; and the place where it stands must not be in too strong a light; for the open day-light has been often known to weaken its power, and, in fine, wholly to spoil it through the glass. Mem. Acad. Par. 1711. See PYROPHORUS.

PHOSPHORUS, *Fulgurating*. See FULGURATING.

PHOSPHORUS *Metallorum*, a name given by some chemists to a preparation of a certain mineral spar, which is found in the mines of Saxony, and other places, where there is copper. The spar to be used on this occasion is that kind which is tinged green, and from its, in some degree, resembling the colour of the emerald, is called by some *pseudosmaragdus*, and by others *lapis smaragdi mineralis*. This is to be powdered very fine, and this powder is to be laid on a flat plate of copper, iron, or any other metal: this plate is then to be set over some lighted charcoal, and the whole placed in a dark place. The spar will receive the necessary degree of heat for shining long before the metal will, and, consequently, as soon as it begins to shine,

the fire is not to be made any brisker. While the plate of metal is held in this degree of heat, and does not appear at all red, the powder upon it will shine like a lighted coal, and will continue so for some time. If it be removed away, and suffered to cool, it will be fit to repeat the experiment a second time with, but its light will not be so strong as before. Phil. Trans. N. 244. p. 365.

PHOSPHORUS *of Sulphur*, the name given by the French academicians to a new-discovered species of phosphorus, which readily takes fire on being exposed to the open air. See PYROPHORUS.

The invention was M. Le Fevre's, and the process is this: the ingredients are two drams of common sulphur, half an ounce of steel filings, ten grains of colophony, and six drams of common water. These things being all weighed and set apart, powder about half a dram of the sulphur in a small mortar, then add the colophony, and afterwards the remainder of the sulphur. When this is all reduced to a fine powder, put in the filings of steel, and rub the whole together till it is so thoroughly mixed, that the steel does not appear, but the colour of the whole looks every where uniform and regular; then add about twenty drops of the water; and after beating the whole together add as much more, and continue to do so till the mass is of the substance of a paste, but not too moist. Put this paste into a small matras that will contain about three ounces, and pour on it more of the water till it swim above the surface of the paste near a quarter of an inch. The matter of the paste will then break, and appear in form of a granulated powder under the water; put the matras on a sand-furnace, but give it no greater heat than that the hand can bear to lie upon the matras. When it begins to heat, the mixture will ferment and swell, and become black; it is then to be stirred with an iron rod, and a little more water must be added every quarter of an hour, till the whole is used. The matter will then be very black and liquid; and it is to be then taken from the fire, and set by for the whole night. This is the first and most essential part of the operation, and in this great care is to be taken that the fire be not too violent; for if the sulphur be burnt the operation will be spoiled; and the matter would ferment so high as to run over at the mouth of the vessel.

To finish the operation, a little water must be added to the matter, so as to swim over it, and the vessel must be again set in the sand, and a stronger fire given than before; this is known to be strong enough when there is any humid vapour observed to arise out of the mouth of the vessel. This fire is to be continued about two hours, that the greater part of the humidity may be evaporated; which is known by the iron rod finding some resistance when put into the vessel, and the matter it brings up being granulated and solid, or no longer moist, it must then be immediately taken from the fire, and the whole is then finished. It is necessary to be very exact in this last and critical minute; for a very little longer standing on the fire will burn the sulphur, and render all the former care of no effect. The black matter remaining in the matras is to be taken out, and the sides scraped clean with an iron rod; any piece of this that happens to fall upon a paper takes fire in a very little time, and burns away like the other phosphorus. The process is a very nice one, but, by observing all the rules here laid down, several persons have succeeded in making the phosphorus to perfection: the whole intent of the operation seems to be to join together the minute particles of steel and sulphur, which when thus joined cannot fail to be very inflammable, and to take

fire on receiving the smallest humidity from the air to make them ferment.

It cannot but be observed, that this phosphorus is founded on Lemery's experiments of steel and sulphur taking fire together; but this is a much more nice and accurate operation, and a fine improvement on the original plan, which was only by mixing large quantities of steel filings and sulphur together into a paste with water, and burying this in the earth to make it take fire of itself, and thus represent the natural phenomena of volcanos, thunder, lightning, &c. Mem. Acad. Par. 1728.

John Baptist Beccaria has shewn, Phil. Transf. vol. lxi. part i. art. 25. that the phosphorus composed of sulphur and calcareous earth, imbibed the peculiar coloured rays to which it had been exposed. Thus, having exposed different phosphoric pieces to rays of the sun transmitted through green, yellow, and red crystals, he observed, that each of them, when afterwards viewed in the dark, exhibited that colour to which it had been exposed. This observation is decisive in favour of the opinion, that phosphorus of this kind emits the same light that it receives, and no other; and that the light is not produced, but expelled by heat.

This experiment, which has often failed, for want of employing good glasses, or on account of the weakness of the solar rays, has been repeated by professor Allamand of Leyden; who says, that having exposed a prepared (probably by calcining it with some sulphureous substance) piece of the Bononian calcareous phosphorus to the coloured rays of the sun, after their being separated by one of his prisms, and looking to it in the dark, he found the phosphorus gave the colour of the separated rays to which it had been exposed.

PHOSPHORUS, *Aquatic*, a name given by Dr. Leigh, in his History of Lancashire, to a water found near Wigan in that county, which takes fire on holding a lighted candle to it. It is not properly the water, however, that takes fire in this case, but a steam which bursts out of the ground with it. The author also calls it a sulphurated water; but that very improperly, for it contains no sulphur, but only issues out with this bituminous vapour.

PHOSPHORUS, in *Astronomy*, is the morning star, or the planet Venus, when she goes before the sun.

The Latins call it *Lucifer*; the French *etoile de berger*; the Greeks *phosphorus*, from *φως*, light, and *φέρω*, I bear, or bring.

PHOSSA, in *Ornithology*, a name understood by some to express the whole genus of pigeons, but more properly it is the name of one species only, the *palumbus torquatus*, or ring-dove. See COLUMBA *Palumbus*.

PHOTIÆ, in *Ancient Geography*, an episcopal town of Asia, in Phrygia Salutaris.

PHOTINIANS, in *Ecclesiastical History*, a sect of ancient heretics, in the fourth century, who denied the divinity of Jesus Christ.

They took their name from Photinus their chief, who was bishop of Sirmium, and a disciple of Marcellus. This prelate published, in 343, his opinions concerning the Deity, which were equally repugnant to the orthodox and Arian systems. He maintained, that Jesus Christ was born of the Holy Ghost and the Virgin Mary; that a certain divine emanation (which he called the Word) descended upon this extraordinary man; that on account of the union of the divine word with his human nature, Jesus was called the son of God, and even God himself; and that the Holy Ghost was not a distinct person, but a celestial virtue proceeding from the Deity. He was condemned by both parties in the

councils of Antioch and Milan, held in the years 345 and 347, and by the council of Sirmium in 351. He was afterwards degraded from the episcopal dignity, and died in exile, in the year 372 or 375. His opinion was afterwards revived by Socinus.

PHOTINUS, in *Biography*. See the preceding article.

PHOTINX, or crooked flute: an Egyptian instrument. Its shape was that of a bull's horn, as may be seen in many gems, medals, and remains of ancient sculpture. Not only the form of this instrument, but the manner of holding it, is described by Apuleius, in speaking of the mysteries of Isis: "Afterwards," says this author, "came the flute players, consecrated to the great Serapis, often repeating upon the crooked flute turned towards the right ear, the airs commonly used in the temple." All the representations in sculpture which we have seen of this instrument, have so much the appearance of real horns, that they encourage a belief of its great antiquity; and that the first instruments in use of this kind, were not only suggested by the horns of dead animals, but that the horns themselves were long used as musical instruments, at least those sounded by the Hebrew priests at the siege of Jericho, we are repeatedly told, were trumpets made of ram's horns.

PHOTIUS, in *Biography*, a patriarch of Constantinople in the ninth century, was of a noble Constantinopolitan family. His wealth and interest raised him to the highest offices of the state, while he enjoyed the reputation of being the most learned and accomplished man of his age. When he was a captain of the guards he was sent on an embassy to the caliph of Bagdad, and he employed his leisure in reading and literary composition. He afterwards became secretary of state under the emperor Michael III. In this situation he contracted an intimacy with the emperor's uncle, who, after he had procured the exile of the patriarch Ignatius, persuaded the emperor to raise Photius to that dignity. At this time he was a layman, but in the space of six days he went through the gradations requisite for priest's orders, and on Christmas day, 858, he was consecrated patriarch of Syracuse. Photius was recognized by the metropolitans of his patriarchate, and proceeded to the solemn deposition of Ignatius. The elevation of Photius caused a great schism, and he exercised severities on those who adhered to his rival. The emperor Basil expelled him in 869, an act that was confirmed by a council summoned for the purpose, who pronounced an anathema, as well as deposition, against the fallen patriarch. Afterwards he obtained the emperor's favour, and on the death of Ignatius he resumed his dignity with a strong hand. Basil obtained from pope John VIII. his consent to the measure, which was ratified at a council holden in presence of the pope's legates in 879. In 886 Leo caused him again to be deprived, and confined in a monastery, where he died in 891. His principal works are; 1. "Myriobiblon or Bibliotheca," composed on his embassy to Bagdad, consisting of an abstract and critical judgment of 280 different writers in the departments of history, oratory, grammar, philosophy, theology, &c. of many of whom no other relic remains: this was printed by Hefchelius in 1601, but the best edition is that of Rouen, Gr. and Lat. 1653. The book which at present bears that name, is not the real production of Photius; and it has been supposed that not more than half of it can be safely attributed to this learned and turbulent bishop. 2. "Nomocanon," or a collection of the canons of the church, printed with the commentaries of Balsamon at Paris in 1615. 3. "Epistolæ," or a collection or Letters, printed by R. Mountagu in 1651. 4. His celebrated

celebrated Lexicon, which, imperfect and mutilated as it is, is more valuable to the critical scholar than ten myriobibla. The various MSS. of this Lexicon, in different libraries on the continent, are mere transcripts from each other, and originally from one, venerable for its antiquity, which was formerly in the possession of the celebrated Thomas Gale, and which is now deposited in the library of Trinity college, Cambridge. This MS., which is on parchment, bears such evident marks of antiquity, that it may not unreasonably be supposed to have been a transcript from the author's copy. It is written in various hands. The compendia, which are used in some parts of it, are extremely difficult to decipher, though, on the whole, they are less so than the contractions which occur in many MSS., and particularly those in the library of St. Germain. A copy of this Lexicon, at Florence, was transcribed about the end of the 16th century, by Richard Thomson, of Oxford, who probably intended to publish it. (See Scaliger *Epist.* p. 503. printed 1715.) Professor Porson had transcribed and corrected this valuable Lexicon for the press, and after it had been consumed by fire, he began the task afresh, and such were his incredible industry and patience, that he completed another transcript in his own exquisite hand-writing. Mr. Porson's copy of the Codex Galeanus is said to be among the papers of that incomparable scholar, which are preserved by the learned society of which he was long a distinguished ornament. But whilst the publication of it was anxiously expected and delayed, an edition appeared at Leipzig in 1808, by Godfrey Hermann, from two MSS., both of them extremely inaccurate.

**PHOTOMETER**, or *Measurer of Light*, as the name, derived from  $\varphi\omega\varsigma$ , *light*, and  $\mu\acute{\epsilon}\tau\rho\eta$ , *I measure*, imports, in *Optics*, an instrument contrived for measuring the different intensities of light. That some luminous bodies give a stronger and others a weaker light, and that some reflect more light than others, are facts that have been always known, and that are sufficiently obvious. But it is not easy to estimate with accuracy the comparative intensity of light afforded by any two, or more, luminous objects. For this purpose, it is necessary to assume as a principle, that the same quantity of light, diverging in all directions from a luminous body, remains undiminished at all distances from the centre of divergence. Thus, we must suppose, that the quantity of light falling on every body is the same as would have fallen on the place occupied by its shadow; and if there were any doubt of the truth of the supposition, it might be confirmed by some simple experiment. It follows that, since the shadow of a square inch of any surface occupies, at twice the distance of the surface from the luminous point, the space of four square inches, the intensity of the light diminishes as the square of the distance increases. We can judge with tolerable accuracy of the equality of two lights by the estimation of the eye; but we cannot form any idea of the proportions of light of different intensities. If, however, we remove two sources of light to such distances from an object, that they may illuminate it in equal degrees, we may conclude that their original intensities are inversely as the squares of their distances. To this subject Mr. Bouguer seems to have first directed his attention. The methods which he used for measuring the proportion of different lights, are described by Dr. Priestley in his "*History of Light, &c.*" as follow. He took two pieces of wood or pasteboard, in which he made two equal holes, over which he drew pieces of oiled or white paper. Upon these holes he contrived that the light of the different bodies he was comparing should fall, while he placed a third piece of pasteboard, to prevent the two lights from mixing with one

another. Then placing himself sometimes on one side and sometimes on the other, but generally on the opposite side of this instrument, with respect to the light, he altered their position, till the papers in the two holes appeared to be equally enlightened. This being done, he computed the proportion of their light by the squares of the distances at which the luminous bodies were placed from the objects. If, for instance, the distances were as 3 and 9, he concluded the light they gave were as 9 and 81.

When any light was very faint, he sometimes made use of lenses, in order to condense it, and he enclosed them in tubes or not, as his particular application of them required. To measure the intensity of light proceeding from the heavenly bodies, or reflected from any part of the sky, he contrived an instrument resembling a kind of portable camera obscura. He had two tubes, of which the inner was black, fastened at their lower extremities by a hinge. At the bottom of these tubes were two holes, three or four lines in diameter, covered with two pieces of fine white paper. The two other extremities had each of them a circular aperture, an inch in diameter; and one of the tubes consisted of two, one of them sliding into the other, which produced the same effect as varying the aperture at the end. When this instrument is used, the observer has his head, and one end of the instrument so covered, that no light can fall upon his eye, besides that which comes through the two holes above mentioned, while an assistant manages the instrument, and draws out or straightens one tube, as the observer directs. When the two holes appear equally illuminated, the intensity of the lights is judged to be inversely as the squares of the lengths of the tubes. In using this instrument, it is necessary that the object should subtend an angle larger than the aperture of the tube from its other end; for, otherwise, the lengthening of the tube has no effect. To avoid, in this case, making the instrument of an inconvenient length, or making the aperture too narrow, he has recourse to another expedient. He constructs an instrument, consisting of two object-glasses, fixed in the ends of two tubes, six or seven feet, or, in some cases, ten or twelve feet long, and having their foci at the other ends. At the bottom of these tubes are two holes, three or four lines in diameter, covered with a piece of white paper; and this instrument is used exactly like the former. If the two objects to be observed by this instrument be not equally luminous, the light that issues from them must be reduced to an equality, by diminishing the aperture of one of the object-glasses; and then the remaining surface of the two glasses will give the proportion of their lights. But, for this purpose, the central parts of the glass must be covered, in the same proportion with the parts near the circumference; because the middle part of the glass is thicker, and less transparent than the rest. If all the objects to be observed lie nearly in the same direction, our author observes, that the two long tubes may be reduced into one, the two object-glasses being placed close together, and one eye-glass sufficing for them both. The instrument will then be the same with that of which he published an account in 1748, and which he called a heliometer, or astrometer. (See **HELIOMETER**.) For some results of the application of these methods for determining the comparative intensities of the light proceeding from different luminous bodies in different circumstances, see **LIGHT**. Count Rumford has used the first of Bouguer's methods, and contrived an instrument for this purpose, called the "Photometer," of which he has given a description and drawing in the *Philosophical Transactions* for 1794, vol. lxxxiv. art. 9. The principle upon which it is grounded is, that if two lights shine upon the same surface, at equal obliquities, and an

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opaque body be interposed, the two shadows it will produce must differ in blackness or intensity in the same degree. For the shadow formed by intercepting the greater light will be illuminated by the smaller light only, and reversely, the other shadow will be illuminated by the greater light: that is, the stronger light will be attended with the deeper shadow. But it is easy, by removing the greater light to a greater distance, to render the illumination it produces at the common surface equal to that afforded by the less. Experiments of this kind may be conveniently made by fastening a sheet of white paper against the wall of a room; and placing the two candles or lights intended to be compared, so that the ray of light from each shall fall with nearly the same angle of incidence upon the middle of the paper. In this situation, if a book or other object be held to intercept part of the light which would have fallen on the paper, the two shadows may be made to appear, on separate surfaces, and also a third or perfect shadow, from which both lights are excluded, may be exhibited. If one or both of the lights be removed directly towards or from the paper, as the appearances may require, until the two shadows near the upper angular point of the perfect shadow have the same intensity, the quantities of light emitted by each will be as the squares of the distances from the paper. By some experiments made in this way, in the year 1785, Mr. Nicholson (see his Journal, vol. i.) was satisfied that the degree of illumination could be thus ascertained, to an 80th or 90th part of the whole.

Count Rumford, in his "Account of a Method of measuring the comparative Intensities of Light," directs two burning candles, lamps, or other lights that are to be compared, to be placed at equal heights upon two light tables, or moveable stands in a darkened room; let a sheet of clean white paper be equally spread out, and fastened upon the wainscot or side of the room, at the same height from the floor with the lights, and let the lights be placed over-against this sheet of paper, at the distance of six or eight feet from it, and six or eight feet from each other, in such a manner, that a line drawn from the centre of the paper, perpendicular to its surface, shall bisect the angle formed by lines drawn from the lights to that centre; in which case, considering the sheet of paper as a plane speculum, the one light will be precisely in the line of reflection of the other.

This may be easily performed, by actually placing a piece of a looking-glass, six or eight inches square, flat upon the paper, in the middle of it, and observing by means of it the real lines of reflection of the lights from that plane, removing it afterwards as soon as the lights are properly arranged.

When this is done, a small cylinder of wood, about a quarter of an inch in diameter, and six inches long, must be held in a vertical position, about two or three inches before the centre of the sheet of paper, and in such a manner, that the two shadows of the cylinder corresponding to the two lights may be distinctly seen upon the paper.

If these shadows should be found to be of unequal densities, which will almost always be the case, then that light whose corresponding shadow is the densest, must be removed farther off, or the other must be brought nearer to the paper, till the densities of the shadows appear to be exactly equal; or in other words, till the densities of the rays from the two lights are equal *at the surface of the paper*; when, the distances of the lights from the centre of the paper being measured, the squares of those distances will be to each other as the real intensities of the lights in question at their sources.

If, for example, the weaker light being placed at the distance of four feet from the centre of the paper, it should

be found necessary, in order that the shadows may be of the same density, to remove the stronger light to the distance of eight feet from that centre, in that case, the real intensity of the stronger light will be to that of the weaker as 8 to 4; or as 64 to 16; or 4 to 1; and so for any other distances.

It is well known, that the intensity of any quality proceeding from a centre in straight lines in all directions, like the light emitted by a luminous body, at any given distance from that centre will be as the square of that distance inversely; and hence it is clear, that the intensities of the lights in question at their sources, must be to each other as the squares of their distances from that given point *where their rays uniting, are found to be of equal density*. For putting  $x$  = the intensity of B; if P represents the point where the rays from A and from B meeting, are found to be of equal density or strength, and if the distance of A from P be =  $m$ , and the distance of B from the same point P =  $n$ ; then, as the intensity of the light of A at P is =  $\frac{x}{m^2}$ , and the intensity of the light of B at the same place =  $\frac{y}{n^2}$ , and as it

is  $\frac{x}{m^2} = \frac{y}{n^2}$  by the supposition, it will be  $x : y :: m^2 : n^2$ .

That the shadows being of equal density at any given point, the intensities of the illuminating rays must of necessity be equal at that point also, is evident from hence, that the total absence of light being perfect blackness, and the shadow corresponding to one of the lights in question being deeper or fainter, according as it is more or less enlightened by the other, when the shadows are equal, the intensities of the illuminating rays must be equal likewise.

In removing the lights, in order to bring the shadows to be of the same density, care must be taken to recede from, or advance towards the centre of the paper in a straight line, so that the one light may always be found exactly in the line of reflection of the other; otherwise the rays from the different lights falling upon the paper, and consequently upon the shadows, at different angles, will render the experiment fallacious.

When the intensity of one strong light is compared with the intensities of several smaller lights taken together, the smaller lights should be placed in a line perpendicular to a line drawn to the centre of the paper, and as near to each other as possible; and it is likewise necessary to place them at a greater distance from the paper than when only single lights are compared.

In all cases, it is absolutely necessary to take the greatest care that the lights compared be properly trimmed, and that they burn clear and equally, otherwise the results of the experiments will be extremely irregular and inconclusive.

To ascertain by this method the comparative densities, or intensities of the light of the moon, and of that of a candle, the moon's direct rays must be received upon a plane white surface, at an angle of incidence of about 60°, and the candle placed in the line of the reflection of the moon's rays from this surface; when the shadows of the cylinder corresponding to the moon's light, and to that of the candle, being brought to be of equal density, by removing the candle farther off, or bringing it nearer to the centre of the white plane, as the occasion may require, the intensity of the moon's light will be equal to that of the candle *at the given distance of the candle from the plane*.

To ascertain the intensity of the light of the heavens by day or by night, this light must be let into a darkened room through a long tube, blackened on the inside, when its intensity

tensity may be compared with that of a candle or lamp, by the method above described.

To determine the intensity of the direct rays of the sun, compared to the light emitted by any of our artificial illuminators, it may perhaps be necessary, considering the almost inconceivable intensity of the sun's light, to make use of some further contrivances and precautions, but I am convinced, however, (says the author,) that it may be done, and that even with a very considerable degree of precision. And when the relative intensity of the sun's light at the surface of the earth, compared with the intensity of the light of a given lamp, placed at a given distance, and burning with a flame of given dimensions, shall be known; it will then be easy, from the known size and distance of the sun, to compute the relative density of his light at his surface, compared to the density of the light of the flame of the lamp at the surface of that flame.

The intensity of the light emitted in the combustion of iron or of phosphorus in dephlogisticated air, as also that of all other burning, or red-hot bodies, may be compared and determined by this method with the greatest facility and exactness.

Count Rumford afterwards found it expedient to make some alterations in the instruments with which he conducted his experiments: and he thus describes them in their finished state, when he denominated the whole apparatus combined a "photometer." For an account of the construction of this instrument, of the purposes to which it is capable of being applied, and of the author's experiments with it, we refer to the Phil. Trans. *ubi supra*.

Professor Lesley has invented an instrument for the same purpose, and under the same name, which he describes as being constructed in the same manner with his *hygrometer*, only that the upper ball is blown of black glass, or is blackened, and the lower one is quite diaphanous, and free of specks. The former detains the incident light, while the latter transmits it freely. But light, in proportion to its absorption, causes heat, whether uniting with bodies it really constitutes the matter of heat, or only excites heat in the act of combination. But though the black ball acquires constant additions of heat, its temperature will not uniformly and perpetually increase; for the accumulated heat will at last be conducted off by the surrounding air exactly as it is received. The depression of the liquor, therefore, will measure the momentary afflux of light. To prevent the irregular effects of winds, which might accelerate that dispersion, the instrument is inclosed within a glass case. But this case serves also an important purpose, for, by confining the circulation of the ambient air, which alone transfers the continual augmentation of heat, it doubles the performance of the instrument. The cylindrical case should be made of clear glass neatly rounded over, and hermetically sealed at the end. Its width is not of much importance, only it should leave a free space not less than  $\frac{1}{10}$ th of an inch round the balls, and at least half an inch at the top. Indeed both the size and form may be regulated by convenience, for I found (says the professor) a receiver of 2200 inches to afford quantities scarcely one-tenth less than those given by a case of the ordinary dimensions.

Since this instrument was first constructed, in the autumn of 1797, Mr. Lesley has been delighted with the nicety of its performance. It not only measures the direct rays of the sun, but the reflected light of the sky, for which it is principally designed. It is sensible to every fluctuation of the atmosphere, marks the progress and decline of the light of day, and the periodic increase and diminution of the brightness of the year. It enables us likewise to estimate other lights, such as the flame of a candle. By comparing two photometers,

it is easy to determine the relative properties of different coloured substances, in reflecting, absorbing, and transmitting light. In the same manner, they will determine the question, whether the particles of light are spread over the prismatic spectrum with equal intensity. By help of this instrument, too, we can measure the quantity of light transmitted through various diaphanous bodies, and that reflected or absorbed at different angles of incidence from polished or rough surfaces; in short, perform with the utmost facility all those ingenious experiments which have exercised the sagacity of Bouguer and Lambert. Another set of inquiries, for which the photometer is nicely calculated, is to discover the conducting powers of different fluids for heat. If the glass case, for instance, be filled with a gas of higher conducting power than common air, the instrument will be proportionally less affected by the same afflux of light, since those are the two balancing conditions. With air, too, of different densities, the effects are materially different. In that way the author has examined various liquids and gases, nay jellies and ice. His experiments on these and other points are completed, and afford results which are satisfactory and important. For a farther account of this instrument, and of a curious and valuable collection of facts established by means of it, we refer to Lesley's "Short Account of Experiments and Instruments on the Relation of Heat to Air and Moisture," 8vo. See *Differential THERMOMETER*.

**PHOTOSCIATERICA**, a term which some authors use for the art of dialling.

The name is derived hence, that the art not only shews the hours by the shadow of a gnomon, whence it is called *sciatERICA*, from *σκια*, shadow; but sometimes also by means of the sun's light, as in spot dials, reflecting dials, &c. from *φως*, lux, light.

**PHOVIBAGINA**, in *Ancient Geography*, a town of Asia, in Galatia, belonging to the Trocmi. It is called by Ptolemy Carissa and Dudusa.

**PHOXINUS**, in *Ichthyology*, a species of *Cyprinus*; which see.

**PHOXOS**, *Φοξος*, one with an acuminate or fastigiated head, that is, sharpened toward the top; the eminences of the forehead or occiput, or both, being depressed, or one or both of those parts beyond measure prominent. But phoxoi are properly those who have the top of their head very much fastigiated and turbinated, and consequently deformed. Therites is described in Homer with such a head.

**PHRAATA**, in *Ancient Geography*, a town of Asia, which belonged to the Medes, according to Appian.

**PHRAATIS GAZA**, an island of Asia, in the course of the Euphrates, which was of great extent, and fortified by a wall; situated W.N.W. of Anatho.

**PHRADRA**, a town of Drangiana, called also Prophthasia. Steph. Byz.

**PHRÆNIAN**, in the *Botanical Writings of the Ancients*, a name given to a kind of anemone, used in making garlands and other ornaments.

**PHRAGANDÆ**, in *Ancient Geography*, a people of Thrace, on the confines of Macedonia.

**PHRAGONIS**, an episcopal town of Egypt, according to the acts of the council held at Alexandria in the year 562.

**PHRANGI**, a people of Italy, in the vicinity of the Alps. Steph. Byz.

**PHRANZA**, **PIRANZES**, **GEORGE**, in *Biography*, a modern Greek historian, was from his youth employed in the service of the Byzantine court, and was the favourite chamberlain of the emperor Manuel Palæologus, who died A.D. 1427, when Phranza was 24 years of age. He was  
master

master of the wardrobe to his successor John, and also to Constantine, the last emperor of the East, by whom he was sent ambassador to the courts of Georgia and Trebizond, for the purpose of negotiating a marriage for the young sovereign. When the Turks took Constantinople, Phranza with his family were made slaves. In a few months, he and his wife were ransomed; but his two children, a son and a daughter, were seized for the seraglio, and lost to their unhappy parents. After this, Phranza became domestic to prince Thomas, brother of the deceased Constantine, who employed him in various embassies. He assumed the monastic habit before his death, which took place at an advanced age. At the request of some noble Corcyreans, he drew up a chronicle of the affairs relating to Constantinople and the Morea, to most of which he had been an eye-witness. This work is brought down to 1461; but though there are many MSS. of the Greek original extant in libraries, it has been published only in the Latin version, or abstract of Pontanus, which, according to Gibbon, is very deficient in accuracy and elegance.

**PHRASE, PHRASIS**, Φραση; of Φραζω, *I speak*, in *Grammar*, an elegant turn or manner of speech, peculiarly belonging to this or that occasion, this or that art, or this or that language.

Thus we say, an Italian phrase, an eastern phrase, a poetical phrase, or a rhetorical phrase.

A few elegant phrases, pertinently applied, are an ornament of discourse; but, if they come too thick, they have an ill effect, and make the style favour of affectation.

**PHRASE** is sometimes also used for a short sentence, or small set or circuit of words, constructed together.

In this sense, father Buffier divides phrases into *complete* and *incomplete*.

Phrases are *complete*, where there are a noun and verb, each in its proper function; *i. e.* where the noun expresses a subject, and the verb the thing affirmed of it. They are *incomplete*, where the noun and the verb, together, only do the office of a noun, as consisting of several words, without assuming any thing, and which might be expressed in a single word.

Thus, *that which is true* is an incomplete phrase, which might be expressed in one word, *truth*: as, that which is true satisfies the mind, *i. e.* truth satisfies the mind.

**PHRASE, Phrase**, Fr., in *Music*, denotes the continuance of an air or harmony, which forms, without interruption, a sense more or less complete, and which is terminated by a cadence more or less perfect. In melody the phrase is constituted by the air; but in harmony, it is a regular series of concords, united together by dissonances expressed or understood.

*Phrase* is frequently used as synonymous with *passage*, in music. It is in the invention of musical phrases, in their proportion and texture, that the true beauties of music consist. A composer who accents and phrases his passages well, is, according to Rousseau, a man of wit. Upon this principle, Haydn's music is full of *bons mots*. A singer who feels, who marks and accents his phrases well, is a man of taste; but he who only sees crotchets and quavers, keys, measure, and intervals in music,—in short, who only sings in time and tune, however ready and certain he may be, if he feels not the accents and phraseology of what he executes, is nothing more than a vulgar ballad-singer.

**PHRASEOLOGY, PHRASEOLOGIA**, Φρασιολογια, a collection of the phrases, or elegant expressions, in any language.

**PHRAT**, the name anciently given to the river *Euphrates*; which see. Phrat is mentioned in scripture, and is

said to have two derivations from the Hebrew, *phar* or *phartz*, to spread, and *pharah*, to produce fruit or flowers. Vincent.

**PHRATRIARCHUS**, Φρατριάρχος, among the Athenians, a magistrate that presided over the *phratrria*, or third part of a tribe. He had the same power over the phratrria, that the phylarchus had over the tribe.

**PHREATA**, in *Ancient Geography*, a town of Cappadocia, in Galisauria. Ptolemy.

**PHREATIS**, or **PHREATTIUM**, in *Greek Antiquity*, a court pertaining to the civil government of Athens, which was situated upon the sea-shore in the Piræus, and derived its name από τῆς Φρεατίας; because it stood in a *pit*, or, as others suppose, from the hero Phreatus. The causes heard in this court were such as concerned persons that had fled out of their own country for murder, or those that fled for involuntary murder, and had afterwards committed a deliberate and wilful murder. The first person that was tried in this place was Teucer, upon a groundless suspicion, that he had been accessory to the death of Ajax. The criminal was not permitted to come to land, or so much as to cast anchor, but pleaded his cause in his bark; and, if found guilty, was committed to the mercy of the winds and waves, or, as some say, suffered there condign punishment; if innocent, he was only cleared of the second fact, and, according to custom, underwent a twelvemonth's banishment for the former. Potter's *Gr. Antiq.* vol. i. p. 111.

**PHRENES**, Φρενη; in *Anatomy*, the diaphragm. It was thus called by the ancients, from Φρηνη, *mind*; because they imagined this to be the seat of the rational soul. Hence,

**PHRENESIS, PHRENSY**, or *Distraction*. See **PHRENITIS** and **PARAPHRENITIS**.

**PHRENETIC NERVES**, called also *diaphragmatic* and *stomachic nerves*, in *Anatomy*, are nervous branches derived from the cervical nerves, which, joining in a trunk, run through the mediastinum undivided, till, arriving near the diaphragm, they again divide, and send off divers branches, some into the muscular, others into the tendinous part thereof.

**PHRENIC**, an epithet applied to parts belonging to the diaphragm, as the nerve, artery, &c. See **NERVE** and **ARTERY**.

**PHRENITIS**, in *Medicine*, from Φρηνη, *the mind*, sometimes written *phrenesis*, a *phrensy*, or a disorder of the understanding, (*sapientie agritudo*, as Pliny denominates it, *Hist. Nat. lib. vii. cap. 51.*) has been understood, however, in a limited sense from the time of Hippocrates; namely, as a continued ferocious delirium, accompanied by an acute fever, and arising from inflammation of the brain, or its membranes. In the language of modern nosologists, *phrenitis* signifies literally *inflammation of the brain*; the termination *itis* implying inflammation of the organ alluded to, as in *hepatitis*, *enteritis*, &c.

Some writers derive the word from Φρηνη, *the diaphragm*, in which organ the mind was anciently supposed to be seated. See **PARAPHRENITIS**.

The symptoms which characterize acute inflammation of the brain are a vehement fever, a violent deep-seated pain in the head, a redness and turgescence of the face and eyes, intolerance of light and noise, continued watchfulness, and an impetuous and fierce delirium. (Cullen, *First Lines*, § 293.) Some writers, indeed, have attempted to establish a distinction, as in the inflammations of other viscera, between the affections of the investing membranes, and of the substance of the brain; and have maintained that the symptoms just enumerated were peculiar to inflammation of the membranes, whilst some degree of coma, instead of wakefulness,

## PHRENITIS.

fulness, characterised the inflammation of the cerebrum itself. The fact is, in this, as in other visceral inflammations, that both parts of the organ are commonly involved in the disease; but it is probable that the symptoms are more violent, in proportion to the predominant affection of the membranes; and more obtuse and chronic, as the malady prevails more extensively in the parenchyma or substance.

But, in truth, the symptoms of inflammation of the common sensorium, the centre of sensation and voluntary motion, are not always so simple and uniform as the signs of a similar affection of other organs. The other parts of the body, which are so intimately connected with the source of the nervous power, and some of which are linked to it by direct and particular sympathies, are necessarily more or less involved in the derangements of the brain. Instead of a mere local disease, therefore, this inflammation becomes more peculiarly a general affection of the system. Hence it is justly remarked by most writers on the subject, that pure idiopathic phrenitis is a very rare disease, at least in this climate; in other words, that the congeries of symptoms, constituting the nosological character of the local inflammation above laid down, very seldom occur without great modifications. It sometimes puts on merely the ordinary character of common continued fever, when dissection has demonstrated not only the existence of inflammation, but of suppuration in the brain. Indeed so common is its occurrence in this form, though to a less degree than is followed by the suppurative process, that an ingenious writer has attempted to prove, that all idiopathic fevers are, in fact, cases of inflammation of the brain (see Clutterbuck on Fever); an opinion which we have discussed at length under its proper head. (See FEVER.) It is universally admitted, however, that, except where external mechanical violence has been suffered, a pure idiopathic phrenitis is rarely observed; but that a secondary or symptomatic inflammation of the brain, of a less determined character, is frequently the result of other diseases, and then partakes more of an atonic or passive form; arising, for instance, during the progress of general fever from any cause, or from metastasis in gout, rheumatism, erysipelas, and other acute disorders. It is justly remarked, indeed, by an intelligent writer, that whenever the velocity of the circulation is much increased, there must always be, from the nature of the circulation in the head, a tendency to this complaint, or to congestion in the larger vessels: hence headache, flushing of face, inflammation of the eyes, bleeding from the nose, and other symptoms denoting preternatural distension of the vessels of the head, are among the most frequent symptoms of continued fever of the more acute kind. Wilson on Febrile Diseases, vol. iii. chap. 6.

*History of the Symptoms.*—Phrenitis often makes its attack with a sense of fullness in the head, flushing of the countenance, and redness of the eyes, the pulse being full, but in other respects natural. As these symptoms increase, the patient becomes restless, his sleep is disturbed, or wholly forsakes him. Sometimes it comes on with tremors of the limbs, and intolerable pains of the hands, feet, and legs; sometimes with stupor and rigidity of the whole body; and sometimes with anxiety, and a sense of tension in the breast, which is often accompanied with palpitation of the heart. Sometimes, again, the stomach is early affected, (by its close sympathy with the brain,) and nausea, and a painful sense of weight in that viscus, sometimes heart-burn and vomiting, are among the earliest symptoms.

The pain in the head soon becomes considerable, and sometimes very acute. The seat of it is various: sometimes it seems to occupy the whole head; sometimes, although

more circumscribed, it is deep-seated and ill defined; and, in other cases, it is felt principally in the forehead or occiput. The redness of the face and eyes generally increases with the pain, and there is often a sense of heat and throbbing in the head, the countenance acquiring a peculiar fierceness.

These symptoms, for the most part, do not last long, before the patient begins to talk incoherently, and to shew other marks of delirium: sometimes, however, delirium does not come on till the fifth, sixth, or seventh day. It gradually increases till it often arrives at a state of phrensy. The face becomes turgid, the eyes stare, and seem as if starting from their sockets, tears, and sometimes even blood, flowing from them; and the patient sometimes resembles a furious maniac, from whom he is principally to be distinguished by the shorter duration of his complaint.

We should, *à priori*, expect in phrenitis considerable derangement in the different organs of sense, which so immediately depend upon the state of the brain; and such is the fact. The eyes are incapable of bearing the light, and false vision, particularly that termed *muscæ volitantes*, or floating motes and flashes of light seeming to dart before the eyes, are frequent symptoms. The hearing is often so acute, that the least noise is intolerable: sometimes, on the other hand, the patient becomes deaf; and it has been even observed, that the deafness and morbid acuteness of hearing sometimes alternate. Affections of the smell, taste, and touch, are less observable.

The pulse is not always so much disturbed at an early period, as might be expected from the violence of the other symptoms, compared with what is observed in idiopathic fevers. In many cases, however, the fever runs as high as the delirium, and the pulse is harder than in common fever; indeed the hard and small pulse is often one of the best diagnostics of the complaint: it is sometimes, though rarely, intermitting. The respiration is generally deep and slow, sometimes difficult, now and then interrupted with hiccup, seldom humid and frequent, which last is a very unfavourable symptom. The deglutition is often difficult, sometimes convulsive. The stomach is frequently oppressed with bile, which is an unfavourable symptom; and complete jaundice, the urine and skin being tinged yellow, sometimes supervenes. Instead of a superabundance of bile, however, there is sometimes a deficiency of it, which seems to afford even a worse prognosis. The fæces being of a white colour, and a black cloud in the urine, have been regarded as fatal symptoms. The black cloud in the urine is owing to an admixture of blood; when unmixed with blood, the urine is generally pale.

Among the most unfavourable symptoms of phrenitis the following may be enumerated; namely, tremors of the joints, convulsions of the muscles of the face, grinding of the teeth, sudden changes of the colour of the face from florid to pale, involuntary tears, a mucous discharge from the nose, the urine being of a dark red colour, or yellow, or black, or covered with a pellicle, the fæces being either bilious or white and very fetid, profuse sweat of the head, neck, and shoulders, paralysis of the tongue, general convulsions, much derangement of the internal functions, and the supervention of the symptoms of other visceral inflammations, particularly of peripneumony. If the delirium changes to coma, and the pulse at the same time becomes weak and the deglutition difficult, the approach of death may be generally expected.

With respect to the *causes of phrenitis*, we have already observed that it is a rare disease in our temperate climate, but is more frequently observed in warm latitudes. The predif-

predisposition seems to consist in the irritability of youth, and of the sanguine temperament, as well as in a passionate temper of mind. The exciting causes are such circumstances, internal and external, as tend to produce an accumulation of blood in the head; among which are the direct influence of a vertical sun in tropical climates, or long exposure to it in hot weather in more moderate heats, especially under great bodily exertions; violent fits of anger; intoxication; concussion, fracture of the skull, or other mechanical violence; long and intense exertion of the mind; certain narcotic poisons, miasmata, and perhaps contagion.

The appearances which are observed on dissection after death vary considerably in different instances, according to the actual seat of the inflammation, and to the duration and violence of the disease. Sometimes the *dura mater* is found reddened by a number of extremely fine vessels, filled with florid blood, which pass between it and the cranium; but this membrane, when inflamed, exhibits less of this crowded state of vessels than many other membranous parts, which are naturally more vascular. Sometimes a layer of coagulable lymph is found adhering upon its under surface, like an adventitious membrane; and sometimes adhesions are formed to a considerable extent between it and the other membranes of the brain. It is not unusual, when the *dura mater* has been inflamed, especially in consequence of some external violence, for suppuration to take place, and pus to be found covering a portion of the membrane. Inflammation of the *pia mater* is more difficult to distinguish for a contrary reason; namely, that in its natural state it is crowded with a great number of minute vessels: when inflamed, however, these small vessels are much more numerous, are filled with a florid blood, and form by their anastomosis a beautiful network: at the same time, there is a stronger adhesion between the under surface of the membrane and the brain than usual. It very rarely happens, that any layer of coagulable lymph is formed in the inflammation of the *pia mater*, which is so very common in that of the *pleura* and the *peritoneum*. When the *pia mater* is inflamed to a high degree, pus is formed, and is sometimes found diffused over the whole surface of the brain. When inflammation has existed in the substance of the brain, it is rarely found extended over any large portion of it, but is rather confined to one or more distinct spots. In this state of disease the inflamed portion becomes of a red colour, although this is seldom very intense. When cut into, the colour is found to arise from a great many small vessels, which are filled with blood; and the part inflamed has no peculiar hardness, but yields nearly the same sensation to the touch, as it would do in a healthy state. If the inflamed portion be upon the surface of the brain, the membranes in the neighbourhood are also commonly inflamed. Inflammation of the brain frequently advances to suppuration, and abscesses are formed in it. When these are of a large size, the weight of the pus breaks down the structure of the neighbouring parts, and they look simply as if they had been destroyed, or very much injured by the pressure. When the abscesses are small, there is an ulcerated appearance of the cavities in which the pus is contained. Portions of the brain become gangrenous occasionally, especially after violent injuries of the head; but this appearance is extremely rare, where inflammation of the brain has originated from any other cause. See Baillie's *Morbid Anatomy*, chap. xxiv.

The cure of phrenitis must be conducted upon the same general principles as that of other acute visceral inflammations; and from the particular importance of the organ in-

flamed, the antiphlogistic and evacuant plan must be pursued with the utmost vigour and expedition.

*Blood-letting* is to be considered as the principal dependence of the practitioner, and the more early it is employed, the more efficacious in general it will prove. It fortunately happens, that, in this complaint, the advantages of general and local blood-letting may be combined; inasmuch as a large quantity of blood can usually be procured from the vessels immediately connected with the inflamed organ. When this advantage can be obtained, it should never be overlooked. It is advisable, therefore, to open the temporal artery, or the jugular vein, and to take a large quantity of blood, according to the violence of the symptoms, and to the age and strength of the patient. Some authors recommend the opening of the artery, and some (especially Dr. Cullen and Hoffmann) prefer the section of the jugular vein. The frantic state of the patient sometimes renders either of these operations difficult, otherwise perhaps the choice is of little importance. We have seen a few instances, in which a free bleeding from the temporal artery was followed by the most speedy and permanent relief, where the phrenitis had followed intoxication and a metallic poison. Dr. M'Bride recommends that the blood-letting be carried to the extent of producing syncope or fainting; and when that effect follows, the relief is perhaps more generally complete; it is, however, rather a precarious rule of practice, and most practitioners prefer the safer mode of repeating the blood-letting at a short interval, than pushing it so far.

The effects of the blood-letting, in diminishing the morbid determination of blood to the head, should be seconded by all other means in our power. The application of cold to the scalp, such as washing it, after shaving, with cold water, vinegar and water, or with æther and spirits, (which last produce a great degree of cold by their rapid evaporation) is often exceedingly beneficial. To assist in lessening the flow of blood to the head, the patient should be kept as near the erect posture as can be borne. At the same time, every irritation, especially those of light and noise, of which the inflamed sensorium becomes peculiarly susceptible, should be carefully withdrawn. Some writers, especially of the old school, have recommended warm bathing to the lower extremities, and the application of blisters and rubefacients to them, for the purposes of revulsion. But Dr. Cullen justly regards them as very ambiguous remedies, which are likely to be productive of injury by increasing the general excitement of the circulation. It has been proposed to immerse the trunk and limbs in the warm bath, while cold applications are made to the head; a practice of which the theory is ambiguous, and a sufficient experience has scarcely been obtained to warrant the recommendation. *Blisters* have been generally applied over the shaven scalp, after the excitement has been somewhat reduced by blood-letting; but, on the whole, the active abstraction of heat, by means of the cold and evaporating fluids, above-mentioned, seems to afford a more decided relief.

In addition to these direct means of diminishing the inflammatory action in the head, the indirect effect, which is produced by copious evacuations from the bowels, obtained by the use of *purgatives*, is of great importance, and should be carefully attended to. Even syncope itself has been produced by profuse evacuations from the intestines, which implies the complete influence over the circulation in the brain, which such operations produce. The free use of cathartic medicines, therefore, should be resorted to in all cases of phrenitis; and if a spontaneous diarrhoea should supervene, the practitioner will be careful not to check it.

As in all other cases of inflammatory fever, every external source of excitement should be carefully excluded; the apartment should be cool and well ventilated; the bed-clothes light; the food liquid and chiefly of milk and farinaceous matters; the drink aqueous, cold, and acidulated. Antimonial and neutral diaphoretics may be exhibited as medicine, with the view of keeping a soft and moist state of skin, and diminishing febrile action.

When phrenitis occurs as a secondary affection in common fever, or by metastasis, it seldom assumes that violent character which idiopathic phreny puts on; and consequently it demands a less vigorous treatment. Nevertheless the principles of the treatment must be the same. The removal of the determination of blood to the head must be attempted by the same measures, used in a more moderate degree. Thus the more local evacuations, such as bleeding by leeches applied to the temples, by cupping and scarifying the neck, and the application of cold, and of blisters to the shaven scalp, must be resorted to, and repeated according to the violence of the symptoms. The bowels should be evacuated by moderate cathartics, and similar diet and regimen should be adhered to as in the more acute species. And it should be cautiously observed, that, even should symptoms of typhoid fever supervene, yet while there is evident congestion in the brain, with flushed face, ferrety eyes, delirium, or coma, wine and all other stimulants must be withheld, as having a direct tendency to aggravate the symptoms, and to accelerate the fatal termination of the disease. See FEVER. See Wilson on Febrile Diseases, vol. iii. chap. 6. Cullen's First Lines.

PHRENSY, a violent delirium, originating from inflammation of the brain. See PHRENITIS.

PHRETOMANORUM URBS, in *Ancient Geography*, a town of Italy, in Samnium, of which Q. Fabius took possession, according to Diodorus Siculus.

PHRICODES, from *φρίξω*, *horror, shivering*, in *Medicine*, a fever described by the ancients, of a remittent, semitercian form, in which the paroxysms are not only ushered in by shiverings, but accompanied by them through the greater part of their duration. See Galen, Comment i. in lib. i. Epidem.

PHRIDIESGAM, in *Geography*, a town of Russia, in the government of Viborg, on the N. coast of the gulf of Finland; 60 miles W. of Viborg. N. lat. 60° 35'. E. long. 26° 34'.

PHRIXIUM, in *Ancient Geography*, a town of Asia, on the confines of the Colchide and Iberia, according to Strabo; who says that, in his time, it was called Ideessa, and that it was well fortified.

PHRIXUS, a town of Asia Minor, in Lycia. Steph. Byz.—Also, a port of Asia, in the Thracian Bosphorus, near its mouth in the Euxine sea. Steph. Byz.—Also, a river of the Peloponnesus, in Arcadia, which received the waters of the Erasinus, and ran into the sea between Temenium and Lerna, according to Pausanias.

PHROLICHINO, in *Geography*, a lake of Russia, in the government of Irkutsk; 60 miles N. of Bargazinik.

PHRONTIS, a word used by Hippocrates as the name of a peculiar disorder of the general nature of the melancholy affections. In this case the patient, he says, feels, as it were, a thorn pricking the abdominal viscera; he is extremely restless and uneasy, and always avoids light and company. He dreads being touched, and becomes timorous and afraid of every thing; he is molested with troublesome dreams, and imagines that he frequently sees spectres and frightful objects.

PHRUGUNDIONES, in *Ancient Geography*, a people

of European Sarmatia, near the source of the Viistula, between the Sulones and the Avarini. Ptolemy.

PHRURÆSUM, mountains of Africa, in the interior of Mauritania Cæsariensis, S.E. of the mountains Malathubolus. Ptolemy.

PHRURI, a people of Scythia, in the vicinity of the Caspian sea.

PHRURIUM, a promontory on the S. coast of the isle of Cyprus, near Curtum, and N.E. of the promontory Curias. The term denotes a fortress.—Also, a town of India, on this side of the Ganges, placed by Ptolemy in the interior of the territory belonging to the Arvarni.

PHRYGANEÆ, in *Entomology*, a genus of insects of the order Neuroptera. The generic character is, mouth with a horny short curved mandible; four feelers; three stemmata; the antennæ are setaceous, longer than the thorax; wings equal, incumbent, the lower ones folded. There are fifty-five species, divided into two sections. The genus Phryganeæ consists of insects, which, in point of habit or general appearance, bear a considerable resemblance to some of the PHALÆNÆ, (which see,) and particularly to those belonging to the division entitled Tineæ. They may be distinguished from moths by their feelers, as well as by the stemmata situated at the top of the head. The Phryganeæ proceed from six-footed aquatic larvæ of a lengthened shape, residing in tubular cases, which they form by agglutinating various fragments of vegetable substances, particles of gravel, &c. These cases are lined within by a tissue of silken fibres, and are open at each extremity. The included larvæ, when feeding, protrude the head and fore-part of the body, creeping along the bottom of the waters which they inhabit by means of six short and slender legs; on the upper part of the back, in most species, is situated an upright papilla or process, serving as a kind of prop or stay, preventing the case from slipping too forward during the time the animal is feeding. The perfect insects are seen in a summer's evening floating in the air in large masses, and are eagerly devoured by swallows. The Phryganeæ are easily distinguished from the smaller moths by their wanting the spiral tongue.

#### A. Tail with two truncate Bristles.

##### Species.

MARGINATA. Wings immaculate; body brown, with yellowish spots on the head, sides of the abdomen yellowish. It is a large insect, and found in Germany. The thorax is grooved on the back; bristles of the tail yellowish, annulate with brown, and as long as the abdomen.

\* BICAUDATA. Wings reticulate; body brown, with a yellowish line on the head and thorax. It inhabits this country and other parts of Europe.

\* NEBULOSA. Wings pale cinereous; body brown. It inhabits also this and other countries in Europe.

VRIDIS. Wings greenish-hyaline, immaculate; body greenish. This is a small insect, and inhabits Germany. The antennæ are green tipped with black; the head and thorax are green, the latter faintly margined with black; the abdomen and legs are greenish.

#### B. Tail without Bristles.

##### Species.

\* RETICULOSA. Wings sub-ferruginous, reticulate with black; body black. An inhabitant of Europe, as is also the next.

\* STRIATA. Wings testaceous, with darker nerves.

## PHRYGANEÆ.

**ANALIS.** Wings brown, with a white spot near the tail; the nape is covered with golden hair. Found in Sweden.

\* **FUSCA.** Upper wings brown, immaculate; legs yellow. An inhabitant of this and other countries in Europe.

**DISCOIDES.** Wings brown, with a pale margin, and spots on the disk; the body is grey. It is found in Germany.

**PILOSA.** Wings testaceous, immaculate; the head and thorax hairy. This is a Swedish insect.

**PALLIPES.** All the wings black, immaculate; the legs are pale. A native of Italy, and is very small.

**SIGNATA.** Wings grey, spotted with yellow, the hind margin is striate with yellow.

\* **GRANDIS.** Wings brown-testaceous, with cinereous spots. This is one of the largest of the European phryganæ, usually measuring an inch or more in length, and having very much the general aspect of a phalæna; the upper wings are grey, marked by various darker and lighter streaks and specks, and the under wings are yellowish-brown and semi-transparent. The larva, which measures nearly an inch and three-quarters in length, is of a flesh-coloured grey, with brown head and legs, and inhabits a tube composed of pieces of bark, small fragments of grass-stalks, or other substances. Like other larvæ of this genus, it is known by the name of *Cadee-worm*, and is frequently used by anglers as a bait. When arrived at its full growth it fastens the case or tube to the stem of some water-plant, or other convenient substance, in such a manner as to project a little above the surface of the water, and casting its skin, changes to a chrysalis of a lengthened shape, and displaying the immature limbs of the future phryganeæ, which in the space of a fortnight emerges from its confinement.

\* **VARIA.** Wings varied with dark-grey and black, and spotted with white in the middle. This has been described and figured by Mr. Donovan. The legs are testaceous, and annulate with black.

**IRRORATA.** Wings grey-brown, with numerous whitish spots and specks. It is found in South America. A specimen of it is in Sir Joseph Banks's museum.

\* **PHALÆNOIDES.** Wings white, with scattered black spots; the body is black. It inhabits the northern parts of Europe.

**FLAVICORNIS.** Wings grey; abdomen greenish; antennæ and legs yellowish. It inhabits Kiel.

\* **RHOMBAICA.** Wings grey-brown, with rhombic whitish spots. This is a much smaller species than the *grandis*, and is of a yellowish-brown colour, with two obliquely transverse rhomboidic semi-transparent white spots on each upper wing; the lower wings being whitish, with a tinge of yellowish-brown towards the upper edge. The larva is of a greenish-brown colour, and like that of the *grandis* is found in rivulets and stagnant waters. The larvæ of the phryganæ in general feed not only on the smaller water insects, but on the spawn of fishes, and even on the young fry itself.

\* **GRISEA.** Upper wings clouded, with a black marginal spot. This is found in England and other European countries.

**ATOMARIA.** Wings pale-grey, with numerous black dots. This is a native of Kiel; is rather a large insect; the antennæ are yellowish; the head and thorax hairy; the body cinereous.

**FENNICA.** Wings striate, cinereous, with a testaceous dot near the tail; the body is black; the antennæ are white at the base. It inhabits Denmark. The antennæ of this species are black at the tip.

**ATRATA.** Black; wings immaculate; antennæ short. It inhabits France. The body is villous.

**NOTATA.** Upper wings yellowish-grey, with a brown marginal spot. It inhabits North America. A specimen is in the museum of Sir Joseph Banks.

\* **BIMACULATA.** Wings brown, with a double yellow lateral spot. It inhabits Europe. The larva is found in a tapering cylinder, composed of sand and mud.

\* **NIGRA.** Wings black; antennæ twice as long as the body. It is found in the northern parts of Europe, as is the next.

\* **AZUREA.** Wings black; the hinder part violet. The lower wings are likewise obliquely violet.

**VARIEGATA.** Wings brown, speckled with testaceous. It is found in divers parts of Germany.

\* **BILINEATA.** Wings brown, with two transverse white lines on each margin. It inhabits northern Europe.

\* **INTERRUPTA.** Wings black, with four white bands, the anterior ones are interrupted, the hind one is marginal and composed of dots. This is a native of our own country, as is the next. The body is black.

\* **HIRTA.** Brown; upper wings hairy; antennæ as long as the body. The antennæ are white, annulate with brown.

\* **LONGICORNIS.** Wings brown, with two darker waved streaks; antennæ are very long. It is found, as well as the next, in this country and other parts of Europe.

\* **QUATUOR-FASCIATA.** Black; wings testaceous, with four black bands; antennæ very long.

**PUNCTATA.** Wings fringed, pale-yellowish, dotted with white; the abdomen is green. It is a native of Paris, and very much resembles a moth.

\* **FILOSA.** Wings rounded, brown, immaculate; antennæ thrice as long as the body. This is a native of England.

**TRI-PUNCTATA.** Wings fringed, cinereous, with three brown dots. It inhabits Saxony. The antennæ are longer than the body.

\* **MINUTA.** Variegated with brown and cinereous; feelers villous. It inhabits Europe.

**PUSILLA.** Wings fringed, brown-testaceous; antennæ moderately long, annulate with white and black. It is a native of Italy.

**ATRATA.** Black; wings whitish, with numerous black spots, and two bands. It inhabits Siberia.

**CILIARIS.** Black; abdomen with a white line on each side; the hind flanks paler; antennæ moderate. It is found in various parts of Europe, but not in England.

**WENERI.** Cinereous; lower wings paler, the inner margin whitish and hairy. It inhabits Sweden, as does the next.

**ALBIFRONS.** Black; wings with four white linear streaks on the outer part.

**FLAVA.** Wings reticulate with yellow; antennæ moderately long. This and all the following are found in some or other of the countries of Europe.

**UMBROSA.** Black; upper wings with yellowish clouds.

**SALTATRIX.** Wings hyaline, with a green and white spot; the antennæ are longer than the body.

**VIRESCENS.** Wings white, with ferruginous spots at the future, and inflected margin; abdomen greenish; legs yellowish.

**ARGENTATA.** Wings varied with brown and silvery, with a brown dot behind the middle at the anterior margin, and three at the posterior; the lower ones tipped with brown.

**FASCIATA.** Wings pale-yellow, with four white bands, one entire, the others composed of spots.

**STRIGOSA.**

**STRIGOSA.** Testaceous; lower wings with a long white streak towards the tip.

**MACULOSA.** Wings brown, hairy, spotted with white, two of the spots solitary towards the tip at the outer margin.

**LACINIOSA.** Testaceous; wings with three white bands united at the base, and each divided at the tip, with an oblique spot in the middle.

**ATOMARIA.** Testaceous; wings grey, with numerous whitish solitary and confluent dots.

**TESTACEA.** Wings and body brown-testaceous; lower ones whitish.

**INCONSPICUA.** Brown; antennæ and fore-feelers long; wings grey, glabrous at the tip; legs yellowish.

**CILIATA.** Black; wings subtestaceous, fringed, the veins at the margin very much branched, the four fore-legs testaceous.

**ANNULATA.** Brown; antennæ long, annulate with white; wings fringed at the inner and hind margins.

**PHRYGANICUS**, in *Botany*, a term used by Dioscorides, and many other of the ancient Greeks, to express such herbaceous plants as have hard and woody stalks; such are the garden-thyme, and several others of that kind. They also call these plants *xylodes*, ξυλωδες, and ξυλωειδέα ποζ.

**PHRYGES**, or **PHRYX**, in *Ancient Geography*, a river of Asia Minor. It discharged itself into the Hermus, gave its name to Phrygia, and separated this province from Caria, according to Pliny.

**PHRYGI**, a people of Illyria, in the vicinity of the Ceraunian mountains. Strabo.

**PHRYGIA**, a country of Proconsular Asia, concerning the name of which there are two different opinions: the one ascribing it to the country, whence it passed to the people; and the other attributing it to the people, who gave it to the country. According to the former opinion some have derived it from the river Phryges or Phryx (now Sarabat;) others from Phrygia, the daughter of Asopus and Europa, an etymology which is founded in mere fable. Bockart supposes, that this tract was called Phrygia from the Greek verb φρυγιω, to burn or parch, which, according to him, is a translation of its Hebrew name, derived from a verb of the same signification. This etymology bears relation to the nature of its soil, which was dry in many parts of it, and which, in its mountains, exhibited traces of volcanos. Another opinion ascribes the name of Phrygia to Phryges, the people who inhabited it; and it is said that they had at a former period borne the name of Bryges or Breges; and these, according to Strabo, were the same people: Herodotus says, that whilst they remained in Europe they were called Breges, but after their passage to Asia, their name was changed into Phryges.

With regard to the boundaries of Phrygia, Strabo informs us, that those of the Phrygians and Mysians were distinct; but that it was scarcely possible to ascertain them. He adds, that the Trojans, Mysians, and Lydians, are all, by the poets, blended under the common name of Phrygians, which Claudian extends to the Pisidians, Bithynians, and Ionians.

Phrygia Proper, according to Ptolemy, was bounded on the north by Pontus and Bithynia; on the west by Mysia, Troas, the Ægean sea, Lydia, Mæonia, and Caria; on the south by Lycia; and on the east by Pamphylia and Galatia. It lies between the 37th and 41st degrees of N. lat., extending in longitude from 56 to 62 degrees. Phrygia is commonly divided into the *Greater* and *Lesser*, called

also Troas; but this division did not take place till Troas was subdued by the Phrygians; and hence it is more considered by some Roman writers as a part of Phrygia, than Bithynia, Cappadocia, or any other of the adjacent provinces. In subsequent ages, the Greater Phrygia was divided into two districts or governments, one called Phrygia Pacatiana, from Pacatianus, who, under Constantine, bore the great office of the præfectus prætorio of the east: the other Phrygia Salutaris, from some miraculous cures said to have been performed there by the archangel Michael.

This country, as well as the whole of Asia Minor lying in the 5th and 6th northern climates, was, in ancient times, highly celebrated for its fertility. It abounded in all sorts of grain, being, for the most part, a plain country covered with a deep rich soil, and plentifully watered by small rivers. In some parts it furnished bitumen and other combustible substances. Having large plains and pasture grounds, it was well stocked with cattle. The air was anciently deemed very pure and salubrious, though it is now, in some parts, thought to be extremely gross, as a great part of the country lies in an uncultivated state. The most remarkable cities in Phrygia Major were the following, viz. Apamea or Apania, the metropolis of all Phrygia, till the above-mentioned division of Constantine took place: this is commonly called Apamea Cibotos.—Laodicea, now Eskihissar, seated on the banks of the river Lycus, not far from Apamea; the inhabitants of which carried on a very considerable trade in wool, which was much admired for its softness, and who were reckoned the most wealthy people in Asia Minor. Laodicea was one of the seven churches mentioned in the Apocalypse; but at present only its ruins are to be seen. At Eskihissar, as it is now called, there are still to be seen four theatres of white marble, as entire as if they had been lately built; near one of them is an inscription in honour of the emperor Titus.—Hierapolis, famous for its mineral waters, which, according to Strabo, when exposed to the air, petrified in the space of a year, and yet possess such a virtue as to render the fields watered by them to be exceeding fruitful, and to afford a present remedy against innumerable distempers. Near this city was a deep cavern, which was always overspread with a thick fog, and which exhaled such a pestilential stream, that it stifled any living creature who approached it. Strabo and Pliny except the Galli or eunuchs of Cybele; Ammianus and Dio Nicæus except all eunuchs. Hierapolis is now called Bambuk-kalasi, and some vestiges of its ancient magnificence may be still seen in heaps of ruins and fine pillars.—Gordium, situated on the borders of Phrygia towards Cappadocia.—Colosse, now Chonos, on the S. side of the Meander.—Sipylus, the residence of king Tantalus, and hence called Tantalus.—Synnada, noted for its marble quarries; built by Constantine the Great, and declared the metropolis of Phrygia Salutaris, after his division took place. Besides these, and other cities of less note, there were some in later times of no small account; such as Saqua, Chara-Chifar, Cillexuga, Einegiol, &c. taken by the Ottomans from the Christian princes, at the first rise of the Ottoman empire.

The rivers of this country are the Mæander, now Madre or Mendre, which rises in the hill Celæne, passes through Phrygia, divides Caria from Lydia, and after, as it is said, 600 windings, by which it seems to flow back to its fountain-head, empties itself into the Archipelago between Priene and Miletus.—Marsyas, rising near or at the spring of the Mæander, and rushing down from a considerable height between rugged rocks, and after flowing through the town of Celæne, in the same channel with

the Mæander, separating into two branches, which form these two rivers; Marfyas pursuing a direct course with an incredible rapidity, and near Apamea being again received into the Mæander. Sangarius or Sangaris, springing from the hill Dindymus, washing Phrygia and Bithynia, and discharging itself into the Black sea.—Phryx or Phryges, (which see.)—Hermus, celebrated by the poets for its gold sands, which rises near Dorylæum, and falls into the Archipelago near Smyrna.—Myſias, Orga, OIrima, &c.

The Phrygians claim high antiquity; but their origin is uncertain. Josephus and St. Jerom suppose that they are descended from Togarmah, one of the sons of Gomer. Herodotus, Strabo, Pliny, and Eustathius deduce their origin from the Brygians, a people of Macedonia, who, passing into Asia Minor, were called Phrygians. Bochart agrees with those who trace their origin to Gomer, the eldest son of Japhet. Whatever was their origin, they were superstitious, voluptuous, and effeminate, without prudence, and so servile in their temper, that they could be induced to comply with their duty only by stripes and ill usage. This character, under which they are described, gave rise to several trite and well-known proverbs: "Phryges sero sapiunt;" "Phryx verberatus melior;" &c. Their music was suited to their effeminate temper, and tended, as some have said, to enervate the mind. The Phrygians are said to have been the first inventors of divination by the singing, flying, and feeding of birds. Their government was monarchical, and they were for some time under one sovereign. But some time before the Trojan war, this country was divided into several petty kingdoms, and several princes reigned at the same period. Apollodorus mentions a king of Phrygia, who was contemporary with Ilus, king of Troy. Cedrenus and others speak of Teuthrans, king of a small part of Phrygia, whose territories were ravaged by Ajax, and his daughter Tecmessa carried away captive by the conqueror. Homer mentions Phorcys and Aæneus, both princes and leaders of the Phrygian auxiliaries, that came to the relief of Troy. Tantalus was king of Sipylus, and he is said to have been no less famous for his great wealth, than infamous for his avarice, and other detestable vices. It is also reported, that with a view of appeasing internal discords, the Phrygians consulted an oracle, which directed them to commit the government to a king; upon which they placed Gordius on the throne.

As to their commerce, we merely know, that Apamea was the chief emporium of all Asia Minor, which was the place of resort for merchants and traders from all parts of Greece, Italy, and the neighbouring islands. From Syncellus we also learn that the Phrygians were for some time masters of the sea, and none but trading nations ever prevailed in that element. The country produced many rare and useful commodities, which afforded considerable exports. They had a safe coast, convenient harbours, and other advantages which warrant our concluding that they carried on a considerable trade. Of their laws we have no knowledge; and in favour of their learning it may be alleged, that, as they enjoyed the sovereignty of the sea, they must have had a competent skill in geography, geometry, and astronomy; to which we may add that they had a more than ordinary knowledge of music.

It has been the opinion of some writers, that the Phrygian language bore a great resemblance to the Greek, but others have alleged to the contrary. The few Phrygian words which have been transmitted to us, are carefully collected by Bochart and Rudbeckius. Strabo also says, that it is difficult to discover any similitude between the barbarous

words of the Phrygian language and the Greek. The Egyptians looked upon the Phrygian tongue as the most ancient language of the world: but other nations, and particularly the Scythians, will not admit this fact.

The ancient Phrygians were much addicted to superstition. They had many idols; but their principal deity seems to have been Cybele. (See CYBELE.) They also worshipped several other idols, viz. Bacchus, Adagyus, and the Cabiri. In solemnizing the festivals of their gods, and on other occasions, they had dances and songs, which they called "lityerfes," from Lityerfes, son of Midas, king of Phrygia. Hefychius mentions certain Phrygian dances, called by him "bricigmata," derived without doubt from the word Bryges, the ancient name of the Phrygians.

The kings of Phrygia whose names are recorded were, Nannacus, Annacus, or Cannacus, who is the first king mentioned in history, Midas, Mareis, Gordius, Gordius II., Otreus, Lityerfes, Midas II., Gordius III., Midas III., and Midas IV., with whom ended the royal family of Phrygia, which became a province of the Lydian monarchy, and continued in that state till Cræsus was conquered, and all Lydia was reduced by Cyrus.

PHRYGIA *Minor*, or *Lesser Phrygia*, was divided into two parts, the maritime, called "Helleſpontica," and the Mediterranean, termed "Epiçtetus." The former borrowed its name from the Hellespont, and extended along the coast from the town of Percote to the promontory Lectum or Lecton, opposite to the N. side of the island of Lesbos. This part was properly called Troas, or Troia, though the Trojan kingdom extended from the river Afopus, to the banks of the Caicus, including not only Troas, but also the greater and lesser Myſia. Epiçtetus, or the inland part of Phrygia Minor, extended to the neighbourhood of mount Olympus, in the greater Myſia. This part at first belonged to Prusias, king of Bithynia, who yielded it, by agreement, to Eumenes, king of Pergamus, whence it was called Epiçtetus, that is, acquired. However, these appellations are frequently confounded, and both attributed to Phrygia Minor.

Phrygia Minor lay between the 40th and 42d degrees of N. lat., and in longitude was of small extent. In general it may be said, that Phrygia Minor, as comprehending both the Helleſpontica and Epiçtetus, was bounded by the Propontis on the N., by the Ægean sea on the S., by Myſia Minor on the E., and the Hellespont on the W. On the sea-coast were the cities of Percote, Abydus, Arifus, Dardanum, Rhetum, Sigeum, Troy or Ilium, Lariffa, Colonzæ, Alexandria, and Troas.

Of the rivers that watered Troas, or Phrygia Minor, we need only mention the Scamander and Simois, which see respectively. The only mountain of this country that deserves notice was mount Ida, being a ridge of hills extending from the city of Zeleia, near the borders of Myſia Minor, to the promontory Lectum.

The soil of this district was anciently reckoned extremely fertile; and it has even now signs of fertility, though in a great measure neglected and uncultivated. Modern travellers describe the Asiatic coast of the Hellespont, as a most beautiful and fertile tract of land; the hills being covered with vineyards and olive plantations, and the vales productive of all sorts of grain.

The inhabitants of Lesser Phrygia, or Trojans, so called from Troy, the metropolis of that country, were undoubtedly a very ancient people; but authors are not agreed about their origin. Some represent them as by descent Samothracians; others say they were Greeks; some again derive them from the island of Crete, whence they suppose Phrygia

Minor to have been peopled; others say, that they were descended from the Arcadians, and there are writers who maintain that they originally came from Italy, in which opinion Virgil concurs.

Bochart thinks that Lesser Phrygia was planted by Ashkenaz, Gomer's eldest son, because some appellatives of lakes, rivers, islands, cities, and men of that country, bear a resemblance to this name. But the blood of the first inhabitants of this country, whoever they were, was mixed in process of time with that of foreigners, namely, of Mylians, Samothracians, Greeks, and Cretans, who settled among them, and were reckoned of the same descent with the ancient proprietors.

As to their government, it was unquestionably monarchical and hereditary; for from Dardanus to Priam, the father was constantly succeeded by the son, or the elder brother by the younger. Their country was at first parcelled out into several small kingdoms: but the sovereigns of all these were, in length of time, either expelled or made tributary by the Trojan kings; inasmuch that Strabo enumerates nine small kingdoms, or principalities, subject to Troy, besides the island of Lesbos. On this account the Trojan war was so protracted; because all these countries were to be subdued before Troy could be invested. Of their laws no particular system remains. Their religion was substantially the same with that of the inhabitants of Greater Phrygia. Their principal deities were Cybele, "the grand-mother of the gods," as they styled her, Apollo, Minerva, and Pallas, (see PALLADIUM,) Venus, and Apollo Sminthius. The Trojans are celebrated as one of the most polite and civilized nations of those days; and in the reigns of their later kings they rose to a very considerable pitch of splendour and magnificence. Their language was probably the same that was spoken by the inhabitants of Greater Phrygia. Their trade can only be guessed at from their situation, which probably drew merchants from all the neighbouring parts to traffic in their country, as well for their own growth as for foreign productions. Their country abounded with the necessaries of life, as we may conclude from their having supported two very considerable armies for many years. Their settlements in Thrace, Peloponnesus, Sicily, Italy, Egypt, and Africa, afford sufficient proof, that they applied themselves at an early period to trade and navigation, which, most probably, were the sources of the riches, splendour, and power, in which they far excelled all the neighbouring states.

Troas, or Phrygia Minor, was, in all probability, governed by kings before the reigns of Teucer and Dardanus; but the Trojan history of that period is either fabulous or uncertain. Teucer, as some say, was the first sovereign; he was the son of Scamander and Ida, that is, born in Phrygia, near the river Scamander and mount Ida, and ruled over all Troas, or Phrygia Minor. From him the country was called Teucra; and the inhabitants were denominated Teuceri. He was succeeded by Dardanus, who extended the boundaries of his kingdom by considerable acquisitions, and built two cities, one called Dardana, or Dardania, from his own name, and the other Thymbra, from Thymbræus, one of his intimates. Having reigned in Phrygia 64 or 65 years, he was succeeded by his son Erichthonius, who after a long, honourable, and prosperous reign of 46, as some say, or according to others, 75 years, left the kingdom of Phrygia in a flourishing condition. Tros, the founder of Troy, was his successor, from whom Phrygia Minor borrowed the name of Troas, as its metropolis did that of Troy. He was succeeded by his son Ilus, who drove Tantalus out of Asia, and annexed his kingdom

to the crown of Phrygia; and having enacted many useful laws for the regulation of public affairs, he died in the 40th year of his reign. On the death of Ilus, his son Laomedon was placed on the throne; he built the citadel of Troy, but having treated Jason and the Argonauts, who had landed on the coasts of Troy, in an inhospitable manner, Hercules, who was one of them, avenged their cause by taking Troy, and afterwards killing Laomedon. Podazers, his only surviving son, was his successor. In his reign happened the war which terminated in the capture of Troy, which see; the city of Troy being utterly ruined, and most of the inhabitants of Troas put to the sword. Some writers say, that the neighbouring Phrygians and Lydians possessing themselves of that country, settled there; and that Troas from that time began to be called Phrygia; others are of opinion, that Æneas, having gathered together the scattered remains of the Trojans, rebuilt the city; and that his descendants, and the descendants of Hector, reigned there till the country was subdued by the Lydians, who became so powerful as to over-run all Asia Minor. If the Trojans had any kings of their own, after their city was destroyed by the Greeks, they probably made but an indifferent figure, since they are not even named in history. *Anc. Un. Hist. vol. iii.*

**PHRYGIAN MODE**, in *Musick*. See *Grecian MODE*. This mode and its effects are so frequently mentioned in ancient authors, that we must collect into a point its pretended properties. The Phrygian mode is one of the principal and most ancient modes of the Greek music. Its character was ardent, fierce, impetuous, vehement, and terrible. So that, according to Athenæus, trumpets and other military instruments, sounded in the Phrygian mode. All this, however, might be said of our trumpets in sounding the charge, signals of battle, and even in playing marches; and that our kettle-drums and side-drums are beaten in the Phrygian mode; in which all music seems at present transposed by the eternal din of double drums and trum-bone.

**PHRYGIAN Stone**, *Phrygius Lapis*, in *Natural History*, the name of a stone described by the ancients, and used in their time in dyeing; probably from some vitriolic or aluminous salt contained in it, which served to enliven or fix the colours used by the dyers.

It was a light spongy mass, resembling a pumice, and the whitest and lightest were esteemed the best. Pliny gives us an account of their preparing it for use for dyeing, which was by moistening it with urine, and then heating it red-hot, and suffering it to cool again: this calcination was repeated three times, and the stone was then fit for use; and Dioscorides recommends it in medicine after burning; he says it was drying and astringent.

**PHRYGIANS**, **PHRYGES**, or **PHRYGASTES**, as St. Epiphanius calls them, in *Church History*, were a branch of the Montanists; so called from Phrygia, a country where they abounded.

They esteemed Montanus their prophet; and looked on Maximilla and Priscilla as great prophetesses.

This spirit of prophecy, or rather enthusiasm, was their distinguishing character. See **CATAPHRYGIANS**.

**PHRYMA**, in *Botany*, a Linnæan name, whose meaning or derivation nobody has ventured to guess, nor can we throw any light upon the subject. *Linn. Gen. 303. Schreb. 399. Willd. Sp. Pl. v. 3. 179. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 3. 431. Juss. 117. Lamarck Illustr. t. 516. Gærtn. t. 75. (Leptostachia; Mitchell Eph. Nat. Cur. v. 8. 212.)—Class and order, *Didynamia Gymnospermia*. *Nat. Ord. Personate*, *Linn. Labiate*, *Juss.**

*Gen. Ch. Cal. Perianth inferior, of one leaf, cylindrical,*

drical, striated, gibbous at the base on the upper side, two-lipped; its upper lip narrow, and longest, with three awl-shaped converging teeth; the lower obtuse, cloven. *Cor.* of one petal, ringent; tube the length of the calyx; upper lip shortest, nearly ovate, emarginate, straight; lower larger and more spreading, three-cleft, the middle segment most prominent. *Stam.* Filaments four, two at each side, the upper ones shortest; anthers roundish, approximated, in the throat of the corolla. *Pist.* Germen oblong; style thread-shaped, the length of the stamens; stigma obtuse. *Peric.* none, except the permanent, furrowed, closed calyx. *Seed* solitary, oblong, nearly cylindrical, with a furrow at one side.

*Est. Ch.* Calyx two-lipped, five-toothed. Seed solitary.

1. *Ph. leptostachya.* Slender-spiked Phryma. Linn. Sp. Pl. 838. Suppl. 277. Amoen. Acad. v. 3. 19. (Circæe foliis, amaranthi sculi Boccone spicâ, floribus parvis purpureis propendentibus, herba Florida; Pluk. Amalth. 59. t. 380. f. 5.)—Leaves ovate, serrated. Calyx of the fruit deflexed.—Native of clove woods in North America; “from Canada to Carolina.” *Michaux.* It is said to have been sent to Kew in 1802, by the late Mr. Masson, and is marked as a hardy perennial, flowering in July and August. The herbage resembles a *Verbena* or *Veronica*, and the flowers, disposed in long slender terminal spikes, are too small and unattractive to obtain much favour. It is to be wished however that a good figure of so little known a plant and genus might be given to the public.

2. *Ph. debileus.* Splitting Phryma. Linn. Suppl. 277. Willd. n. 2. (Buchnera cuneifolia; Linn. Suppl. 288. Willd. Sp. Pl. v. 3. 335. Thunb. Prodr. 100.)—Leaves wedge-shaped, sharply toothed at the summit. Calyx of the fruit erect, splitting lengthwise. Gathered by Thunberg at the Cape of Good Hope. (See *BUCHNERA.*) The younger Linnæus was not aware of having mentioned this plant under two different names, in his *Supplementum*, nor did Willdenow detect the mistake, though he justly objected to its being a *Phryma*. We must rely on Thunberg's authority in supposing it a *Buchnera*. The stem is shrubby, much branched, of humble growth. Leaves opposite, stalked, wedge or fan-shaped, fleshy, rough with minute points or bristles; terminating in about seven strong sharp teeth. Clusters terminal, solitary, simple, three or four inches long, of numerous flowers, which Linnæus the elder has very carefully described on his specimen before us, as follows. “Calyx of one leaf, cylindrical, with five angles; abrupt, with five teeth; finally splitting along one side. Corolla of one petal; tube cylindrical; limb in five, nearly equal, small, rounded segments. Stamens two long and two short. Germen superior, oblong; style short; stigma simple. Seed (rather capsule) almost as long as the calyx, obscurely quadrangular, compressed, smooth, rugged in the upper part; abrupt at the base; of two cells. Seeds solitary, somewhat club-shaped.” The fewness of the seeds is the chief objection to our considering this plant as an indubitable *Buchnera*. Perhaps it ought to constitute a new genus, but its habit closely agrees with the Linnæan *Buchnera cernua*, an imperfect specimen of which is actually laid into the Linnæan herbarium as a nondescript *Phryma*. We are unacquainted with the number of its seeds.

*PHRYNICUS*, surnamed *Arbafus*, in *Biography*, a Greek sophist or orator, was a native of Bithynia, and flourished in the reigns of Marcus Antoninus and Commodus. Two works are attributed to him, viz. “Apparatus Sophisticus,” and “Dictiones Atticæ.” There is extant an abridgment of the latter, which was printed at Rome, with the title of “*Eclogæ Nominum et Verborum Atticorum*,”

Gr. et Lat. 1517. The best edition of this work is that of Pauw in 1739. Of the same name were a composer of a tragedy, the disciple of Theopis, and a comic poet, who flourished about a century later.

*PHRYNIUM*, in *Botany*, a name borrowed by Willdenow from the ancient Greeks, whose *φρυνίον* was so called from *φρυνη*, a red kind of land toad, reputed venomous, to which the plant in question, being armed with spines, was thought to be hostile. Our *Phrynum* is a smooth herb, growing in damp shady places, and rather affording shelter to various reptiles, than dangerous to any. Willd. Sp. Pl. v. 1. 17. Rofcoe Tr. of Linn. Soc. v. 8. 341. (Phyllodes; Loureir. Cochinch. 13.)—Class and order, *Monandria Monogynia*. Nat. Ord. *Scitamineæ*, Linn. *Cannæ*. Brown Prodr. Nov. Holl. v. 1. 307.

*Gen. Ch.* Cal. Perianth superior, of three awl-shaped, erect, equal leaves. *Cor.* of one petal, tubular; its limb in seven segments; the three outermost acute, nearly equal, reflexed; the four innermost obtuse, erect, unequal. Nectary a long, channelled, upright lip. *Stam.* Filament solitary, awl-shaped, short, united to the base of the nectary at one side; anther oblong, irregular, simple. *Pist.* Germen inferior, ovate, triangular; style thick, short, scarcely exceeding the stamen; stigma concave, bent towards the anther. *Peric.* Capsule bluntly triangular, of three cells. *Seed* solitary, ovate, smooth.

*Est. Ch.* Calyx of three leaves. Inner segments of the corolla four, obtuse, unequal. Stamen awl-shaped. Anther simple. Style thick, short, inclined towards the anther. Capsule with one seed.

*Obs.* It appears by the descriptions of authors, for we have not seen the fruit or germen, that the latter is of three cells, with the rudiments of three seeds, only one of which comes to maturity. Yet Willdenow mentions “three nuts.”

1. *Ph. capitatum.* Willd. as above. (Phyllodes placentaria; Loureir. Cochinch. 13. Naru kila; Rheede Malab. v. 11. 67. t. 34.)—Native of moist shady places in Cochinchina China, and the coast of Malabar. *Root* perennial, knotty, creeping horizontally. *Stem* none. *Leaves* radical, on long, simple, upright smooth stalks four feet high, ovate-oblong, acute, entire, flat, smooth, coriaceous, a foot long, obliquely furrowed. *Flowers* white, in a large sessile hemispherical cyme, from a lateral cleft below the middle of the leaf-stalk, accompanied by two large bracts, embracing several smaller ones, each common to many flowers. Loureiro observes that the germen is generally abortive, and that the leaves are used for wrapping up cakes, in the oven, to give them an agreeable taste as well as colour. The young unfolded leaves are infused in rum or arrac, with thrice as much water, to make vinegar.

This may perhaps not be the only species of its genus. We have two nondescript plants gathered at Sierra Leone, by Dr. Afzelius, which that excellent botanist judged to belong to *Phrynum*. Their inflorescence however seems to be terminal, and we are rather more inclined to refer them to *Thalia*, or perhaps *Maranta*.

*PHRYNUM*, in *Zoology*. See *RANA* *Bufo*.

*PTHALEON*, in *Ancient Geography*, a town of Greece, upon the Pegaean gulf.

*PTHAS*, in *Mythology*, a name given among the Egyptians to the Greek Vulcan, whom they considered as the Supreme Divinity, or at least as an attribute of that active principle, or intelligent power, eternally united, in their opinion, with the chaotic mass, by whose energy the elements were separated, and bodies were formed, and who continually presides over the universe, and is the efficient cause of all effects. For this we have not only the autho-

rity of Plutarch (Isis et Osiris), who may be suspected of having exhibited the Egyptian philosophy in a Grecian dress, but the united testimony of many writers, who give such accounts of the Egyptian gods, Phthas or Vulcan, and Cneph or Agathodæmus, as render it probable that these were only different names expressing different attributes of the Supreme Divinity. The Egyptians, says Eusebius, call the maker of the universe by the name of Cneph, and relate, that he sent forth an egg from his mouth; which in their symbolical language denotes that he produced the universe. (See CNEPH.) Diodorus Siculus (l. i.) speaks of the Egyptian Vulcan as the first king among the gods, and Manetho ascribes to him unlimited duration, and perpetual splendour. The name itself, Phthas, signifies, according to Jablonski, in the Coptic language, one by whom events are ordained, or the disposer of things. When the Egyptians mean to represent the ruler of the world as good, they called him by the appellation Cneph, denoting a good genius; and they represented him under the symbol of a serpent. Upon a temple dedicated to Neithas at Sais, the chief town in Lower Egypt, was this inscription; "I am whatever is, or has been, or will be, and no mortal has hitherto drawn aside my veil; my offspring is the sun." Plutarch and Proclus mention this inscription, though with some difference of language; and it is so consonant to the mythological spirit of the Egyptians, that notwithstanding the silence of more ancient writers, who treat of this theology, its authenticity may be easily admitted. If this be allowed, and if, at the same time, it be granted, as the learned Jablonski maintains (Pantheon Egypt.), that Neithas and Phthas were only different names for the same divinity, this inscription will be a strong confirmation of the opinion, that the Egyptians acknowledged the existence of an active intelligence, the cause of all things, whose nature is incomprehensible. On the obelisk of granite, transported from Egypt to Rome, amongst the hieroglyphics of which Hermaphion has given the interpretation, is the following remarkable passage, on the subject of Ramesses, king of Heliopolis: "This is he, whom Phtha, the father of the gods, has elected." These words, the father of the gods, point out the stars, which the Egyptian sages regarded as the most striking emblems of the divinity, and which the people really adored.

Upon the whole we may conclude, that Phtha was regarded, in remote antiquity, as the ordaining spirit, and the great architect of the universe. The inhabitants of Memphis raised a temple to him where he was principally worshipped. Herodotus and Diodorus Siculus have described this temple; and Suidas adds, the inhabitants of Memphis adore Vulcan under the name of Phtha. From Phtha we ought not to separate the god whom the Egyptians adopted under the name of Neith, since he also is the creating spirit. Neith, in fact, signifies, according to Jablonski, him who disposeth all things. By the first of these attributes, God was understood to be taken in a general sense, and by the second, his wisdom was particularly characterised. He had a temple at Sais; and Plato, who frequented it says, Neith, to whom the Greeks have given the name of Minerva, is its tributary deity. Neith and Phtha are therefore the same divinity. The Phœnicians, who received their religion and their knowledge from their brethren the Egyptians, likewise acknowledged Minerva, or Neith, for the artist of nature. Cadmus, the Phœnician, who carried this worship into Greece, gave the name of Neith to one of the seven gates of Thebes, in Bœotia; and there the Egyptian theology was taught. The Egyptians adoring the power of the creator under the name of Phtha,

and his wisdom under that of Neith, honoured his beneficence, by calling him Cneph, or good, by way of excellence.

In fine we may conclude, notwithstanding what has been advanced to the contrary by Porphyry, and others, that it appears highly probable, that the ancient Egyptians acknowledged an active as well as a passive principle in nature, and as Plutarch asserts, worshipped  $\tau\omega\ \tau\epsilon\tau\alpha\rho\alpha\ \Theta\epsilon\iota\omega$ , the supreme deity. Brucker's Phil. by Enfield, vol. i. Savary's Travels in Egypt, vol. i.

**PTHĒMBUTI**, in *Ancient Geography*, a nome of Egypt, the capital of which was called "Tava" by Ptolemy.

**PTHENOTES**, a nome of Egypt, the capital of which was Butos. Ptolemy.

**PTHIA**, a port of Africa, in Marmarica, between the great Chersonesus and Paliurus.—Also, a town of Asia, in the vicinity of the Euxine sea.

**PTHINTHIA**, a town situated in the interior of Sicily. Ptolemy.

**PTHIOTIS**, a country of Greece, in Thessaly; it lay to the S.E. near Magnesia.

**PTHIRA**, or **PTHIRO**, a mountain of Asia Minor, in Caria. Steph. Byz. and Suidas.

**PTHIRIASIS**,  $\pi\theta\iota\rho\iota\alpha\sigma\iota\varsigma$ , in *Medicine*, from  $\pi\theta\iota\rho\iota$ , a louse, signifies the lousy disease, *morbus pedicularis*, and *pediculatio*, of authors.

Of these well-known insects, which infest the human body, there are two species; the one more commonly affecting the hairy scalp, and the other the pubes. Of the former species, however, (the pediculus humanus,) there is a variety usually termed body-lice, concerning which Linnæus remarks, "Varietas capitis durior, colorator, vestimentorum laxior, magis cinerea." These pediculi are bred abundantly among the inhabitants of fordid dwellings, of gaols, and work-houses, &c. and in such situations prey upon persons of all ages indiscriminately. There is, however, also a peculiar itate of skin in people advanced in years, and connected with the disease, which has been denominated Prurigo senilis by Dr. Willan, in which they are generated, notwithstanding every attention to cleanliness or regimen, and multiply so rapidly, that the patient endures extreme distress from their perpetual irritation. The nits or eggs are deposited on the small hairs of the skin; and the pediculi are only found on the skin or on the linen, and not under the cuticle, as some of the old authors have represented. Many marvellous stories, indeed, are related by Forestus, Schenckius, and others, respecting lice bred under the skin, and discharged in swarms from abscesses, strumous ulcers, and vesications: and many individuals of great note are stated to have died, in ancient times, from the multitude of these devouring pediculi. Thus Plutarch relates of Sylla: "It was long before he perceived that he had an ulcer within his body; but at last the flesh putrefied, and produced such a quantity of lice, that though many persons were employed day and night in destroying them, yet they increased much faster than they could be removed; and to such a degree did the distemper prevail, that his clothes, baths, basins, and food, were polluted with that perpetual flux of corruption and vermin. He went many times in the day into the water, to scower and cleanse his body, but all in vain; the vermin multiplied so fast as to baffle every attempt to destroy them." The biographer adds, "it is said, that among the ancients, there died of this disease Acastus the son of Pelias, and nearer our own times Alcæon the poet, Pherecydes the philosopher, Callisthenes the Olynthian, during the time of his imprisonment, and Mutius

Mutius the lawyer: and if it be proper to add to these a person not distinguished by any merit or virtue, Eunus, a fugitive slave, who was author of the war in Sicily, called the "fervere war," and who was taken and carried prisoner to Rome, died likewise of this sickness." (See Plutarch's Life of Sylla; also, Plin. Hist. Nat. lib. xxvi. cap. 13, who, speaking of phthiriasis, observes, "quæ Sylla dictator consumptus est.") Herod, Ennius, and by some Plato is said also to have been destroyed by the lousy disease.—In more recent times, Amatus Lusitanus has affirmed, that he was witness to the case of a gentleman, who perished miserably in this disease: "for to universally did these insects swarm over his body, that two negro servants were entirely employed in collecting baskets full from his person, and carrying them to the sea." Amat. Lusit. Contur. iii. Cur. 58. See also Forest. Obs. Med. lib. viii. obs. 14. Johan. Schenck. Obs. Med. lib. v. obs. 2.

The mode in which pediculi are generated being now well ascertained, and such fatal swarms of them being altogether unknown in modern experience, we can scarcely give credit to these accounts. They are not only in all probability much exaggerated, but have actually originated in mistake. We have shewn in a former article (see INSECTS infesting the human body), that the larvæ or grubs of several winged insects, especially those of the common fly (*Musca domestica*, Linn.), and of the black beetle (*Tenebrio molitor*), not unfrequently breed, both in the internal passages, and in external wounds, of the human body. And in warm climates, the flies are so numerous about the persons of the sick, that the utmost care is requisite to prevent the generation of larvæ from the eggs which they deposit, not only in superficial wounds, but in the nostrils, mouth, gums, &c. sometimes even penetrating to the brain itself, and producing death. (See Dr. Lempiere's Observat. on the Diseases of the Army in Jamaica, vol. ii. p. 182.) In the same way maggots are sometimes generated in the patches of cutaneous eruptions, as described by professor Murray of Gottingen in the case of leprosy. (See his Obs. de Vermibus in Lepra obviis. p. 25.—See also Bateman's Pract. Synopsis of Cutaneous Diseases, p. 21. and Edin. Medical and Surg. Journal, for January 1811, p. 41.) From this view of the subject, therefore, little doubt can remain, that the fatal cases of antiquity, above alluded to, occurring in the warmer regions of Europe, were in reality cases of ulceration, arising from scurvy or some other cachectic condition, which afforded a nidus for the breeding of the maggots of flies, and were not true instances of the morbus pedicularis.

The generation of lice, however, in connection with the prurigo of elderly people, though not fatal, is frequently a very troublesome and obstinate malady, and many external applications have been resorted to from ancient times to destroy these loathsome and irritating parasites. But the destruction of them is commonly a mere alleviation; since their reproduction is extremely rapid. A decoction of the seeds of stavacre, or of the cocculus indicus, or the powder of either of these substances, alone or mixed with lard in the form of an ointment, are very effectual destroyers of the pediculi of the head, and even of the body-lice. The mercurial ointments, such as that of the white precipitated oxyd, are also very efficacious in the same instances. For the *morpiones*, or crab-lice, as they are called from their round and flattened form, which fix themselves firmly in the skin, about the pubes, axillæ, and in fact on every part of the trunk and extremities where there is hair, are instantly and completely destroyed by inunction with the common blue mercurial ointment. The spike-oil, as it has

been called, which is the essential oil of lavender, mixed with oil of turpentine, has been deemed the most efficacious poison for these *morpiones*: its virtue depends perhaps principally upon the oil of turpentine, which is doubtless the most ready instrument of destruction to all the insect tribe. Sir Edward Wilmot is said by Dr. Heberden to have used, with complete success, in a case of morbus pedicularis, a composition somewhat similar to the spike-oil; viz. of rectified oil of turpentine, and spirit of wine, each four ounces, camphor six drachms. A solution of the corrosive muriate of mercury in spirit is also often efficacious in the pedicular prurigo of the body, and tends to remove the pruriginous affection of the skin, which seems to give rise to the tendency to generate lice. It is to be observed, however, as a matter of caution, that none of these pungent stimulating substances can be applied to the skin, without inflicting extreme pain, unless its surface be unbroken: for where the cuticle is abraded by scratching, or by the breaking of pustules and vesicles, or by the formation of rhagades or chaps, the irritation and smarting excited by them is intolerable, and is followed by considerable inflammation.

PTHIRION, in *Botany*, a name used by some authors for the *pedicularis*, or red rattle.

PTHIROPHAGI, in *Ancient Geography*, the name of a people who inhabited the coasts of the Euxine sea. Mela.

PTHISIS, in *Medicine*, from *ῥῖνω*, to corrupt, signifying corruption or emaciation in general, is commonly limited to that species of emaciation, which arises from a disease of the lungs; whence the epithet *pulmonalis* is usually conjoined with it, denoting *pulmonary consumption*. See CONSUMPTION.

PTHUTH, in *Ancient Geography*, a river of Africa, in Mauritania Tingitana. Ptolemy.

PHU, in *Botany*, a name by which some authors call the great garden valerian.

PHUCAGROSTIS, *ῥυκαγροστὶς*, from *ῥυκος*, a sea-weed, and *αγροστὶς*, grass, a name which has been applied to the *Zosteræ*, or Grass-wrack. Cavolini, an eminent Neapolitan naturalist, has given it a temporary adoption, to distinguish one of the genera, of which he has found several confounded under *Zosteræ*. His *Phucagrostis* is, however, well shewn by Mr. König, in Ann. of Bot. v. 2. 92, to be itself the true Linnæan *Zosteræ*; and the name is, moreover, inadmissible, as being compounded of two already established, *Agrostis* and *Fucus*; in which respect it is no less faulty than the *Calamagrostis* of some writers.

PHUMANA, in *Ancient Geography*, a town of Asia, in Babylonia, in the vicinity of Arabia deserta, according to Ptolemy, who marks it between Chuduca and Coesa.

PHUPIAGENA, a town of Asia, in Lesser Armenia, in the interior of the country towards the mountains between Arana and Mardara, according to Ptolemy.

PHUPHENA, a town of Asia, in the interior and near the mountains of the Lesser Armenia, between Ispa and Arana, according to Ptolemy.

PHUSIANA, a town of Asia, in the interior of Assyria, between Gomara and Hone, according to Ptolemy.

PHUSIPARA, a town of Asia, in Lesser Armenia, between Cienica and Eufimara. Ptolemy.

PHUT, a country and river of Africa, in Mauritania Tingitana. Pliny.

PHYCIS, in *Ichthyology*, the name of a species of blennius, called *linca marina*, or sea-tench: the lesser hake of the British zoology.

PHYCIS is also a name given by Artedi, after Aristotle, Pliny, and the rest of the ancients, to a fish nearly allied

to the genus of the *blenni*, and called by some *trebius* and *fuca*; and, according to Rondeletius, the *tinca marina* of the Italians. Salvan, however, denies that it is the *tinca marina*, and the matter is yet undecided among the writers on this subject.

PHYCITES, in *Natural History*, the name given by the ancients to a stone which had the impression of a sea-plant of the fucus or alga kind; probably in the manner in which our black coal slate is frequently found to contain the impressions of fern and other vegetables.

PHYCTEUM, in *Ancient Geography*, a town of Greece, in the Peloponnesus.

PHYCUS, a promontory and fortress of Africa, in Cyrenaica, between Aptuchi Fanum and Apollonia. Ptolemy.

PHYCUSSÆ, islands of Libya. Steph. Byz.

PHYGELA, a town of Asia Minor, in Ionia. Mela and Pliny.

PHYGETHLON, in *Surgery*, a carbuncle, or a phlegmon attended with considerable heat, pain, redness, &c.

PHYLA, in *Botany*, a genus of Loureiro's, named by him from φυλα, a tribe, or company, because a considerable number of flowers are produced from one common calyx. Loureir. Cochinch. 66.—Class and order, *Tetrandria Monogynia*.

Gen. Ch. *Common Calyx* ovate, imbricated, of numerous, crowded, spatulate, pointed leaves, containing many flowers. Perianth inferior, of two lanceolate, concave, erect leaves. *Cor.* of one petal, tubular, irregular; limb short, spreading, in four nearly equal segments, the uppermost emarginate. *Stam.* Filaments four, short, in two rows below the mouth of the tube; anthers roundish, two-lobed. *Pist.* Germen superior, roundish; style short; stigma thickish. *Peric.* none. *Seeds* solitary, naked, covering a thread-shaped, naked, common receptacle.

Eff. Ch. *Common calyx* imbricated; proper of two leaves, inferior. *Corolla* four-cleft, irregular. *Anthers* roundish, within the tube. *Seed* solitary.

1. *Ph. chinensis*.—Native of China, where it is called *Liên sún*. The stem is herbaceous, annual, creeping, with ascending branches. *Leaves* opposite, ovato-lanceolate, pointed, smooth, serrated towards the point only. *Flower* pale violet, lateral, on a long solitary stalk. The author suspected an affinity between this plant and *Protea*, guided, as it seems, by the artificial characters only, by which many an honest man, setting a false step in the beginning, has, like Gulliver's Laputian mathematicians, been led widely astray. Nothing indeed can less accord with *Protea*, than the plant indicated by the above description, which we strongly suspect to be no other than *Verbena nodiflora*! In that case however the seeds should have been described two to each flower.

PHYLACA, in *Ancient Geography*, a place in the Peloponnesus, where is the source of the river Alpheus. Pausanias.—Also, a town of Epirus, in the Molosside. Livy.—Also, a town of Macedonia, in Pieria. Ptolemy.

PHYLACISTÆ, among the *Ancients*, officers to whose keeping the slaves in prisons and work-houses were committed.

PHYLACTERY, φυλακτήριον, signifying a memorial or preservative, in *Ecclesiastical History*, a slip of parchment, wherein was written some text of holy scripture, particularly of the Decalogue; which the more devout people among the Jews inclosed in leather cases, and bound with thongs on the forehead, and on the left arm. (See *FRONTAL*.) On these phylacteries were written thirty passages out of Exodus and Deuteronomy. The phylacteries for

the head had four cavities, into each of which was put one of the four following sections of the laws, viz. Exod. xiii. 1—10. Exod. xiii. 11—16. Deut. vi. 4—9. Deut. xi. 12—13. The other has but one cavity, and into that four sections are put.

They derived their name from φυλαττω, *I keep*, either because they were supposed to preserve the law in memory, or rather, because they were looked upon as a kind of amulets or charms to keep them from danger. They were called הפלין, *tephillin*, by the Jews. The Pharisees, in order to maintain an appearance of greater sanctity, or to attract notice by their ostentation, wore broader phylacteries, and larger fringes to their garments than the rest of the Jews. (Matt. xxiii. 5.) Some authors have inferred from Exod. xiii. 9. and Deut. vi. 8. that these phylacteries were of divine institution. But these passages may be taken in a figurative sense, as they are by the Caraites, who wear no phylacteries at all. In our Saviour's time, however, they were worn by the Jews in general, by the Sadducees, who received only the law, as well as by the Pharisees, but with this difference, that those of the latter were larger than the others.

PHYLACTERY, in the general, was the name given by the ancients to all kinds of charms, spells, or characters, which they wore about them, as amulets, to preserve them from dangers or diseases.

The primitive Christians also gave the name phylacteries to the cases wherein they inclosed the relics of their dead.

PHYLARCHUS, φυλαρχος, among the Athenians. The phylarchi were magistrates, who had each of them: the government of a tribe committed to his charge; and their business was to take care of the public treasures belonging to each tribe, to manage all their concerns, and call them together as oft as any thing happened that required the presence of the whole body.

PHYLATERIA, a name given by some botanical authors to the *polium*, or poly-mountain.

PHYLICA, in *Botany*, an ancient Greek name, occasionally written either φυλικον or φυλικον; but to what it properly belongs, commentators have not determined. Theodore Gaza supposed it our Holly, *Ilex Aquifolium*. It is acknowledged to have been a tree or shrub with evergreen leaves, and possibly the name may have originated from φυλλικός, *leafy*; in which sense it is well applied to the present Linnæan genus, consisting of shrubs with very copious evergreen foliage.—Linn. Gen. 105. Schreb. 142. Willd. Sp. Pl. v. 1. 1108. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 2. 19. Thunb. Prodr. 44. Juss. 381. Lamarck Illustr. t. 127. Gærtn. t. 24.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Dumose*, Linn. *Rhamnii*, Juss.

Gen. Ch. *Cal.* Common receptacle of the fructification scaly, collecting the flowers into a disk. *Perianth* superior, of one leaf, in five deep segments, turbinate, villous internally, permanent. *Cor.* none, except five minute, pointed, vaulted, converging scales, one at the base of each segment of the calyx. *Stam.* Filaments five, minute, under the five scales; anthers simple. *Pist.* Germen inferior, roundish; style simple; stigma obtuse. *Peric.* Capsule roundish, three-lobed, with three cells and three valves. *Seeds* solitary, roundish, gibbous at one side, angular at the other.

Eff. Ch. *Perianth* in five deep segments, turbinate. Scales five, covering the stamens. Capsule inferior, of three cells. *Seeds* solitary.

All the known species of *Phylica* are natives of southern Africa, chiefly about the Cape of Good Hope. Linnaeus defines six only in *Sp. Pl.* ed. 2, but the 14th ed. of *Syll.*

*Leg.* contains twelve. Willdenow has nineteen; Thunberg's *Prodromus* seventeen. The new edition of the *Hortus Kewensis* mentions twelve as cultivated in the gardens about London, most of them introduced by the late Mr. Masson. They are greenhouse shrubs, flowering for the most part in the winter or early spring, distinguished by a bushy heath-like habit; copious, minute, terminal, white or woolly blossoms; and small, simple, numerous, scattered, linear or ovate leaves, whose upper surface is of a dark or shining green, the under pale, hoary, or woolly. Their footstalks are short, and in one instance at least accompanied by a pair of awl-shaped stipulas. As the species require no critical illustration, the following will be sufficient examples.

*Ph. ericoides.* Heath-leaved Phylica. Linn. Sp. Pl. 283. Willd. n. 1. Ait. n. 1. Curt. Mag. t. 224. (*Alaternoides africana*, *ericæ foliis*, *floribus albicantibus et muscosis*; *Comm. Hort. v. 2. 1. t. 1.*)—Leaves linear, revolute, imperfectly whorled. Flowers woolly.—Miller, and Curtis after him, erroneously assert this species to be a native of Portugal, covering extensive tracts of ground about Lisbon, as heath does in England. It is not mentioned by Brotero, in his *Flora Lusitânica*, nor does any other writer speak of it but as a Cape plant, brought into England above seventy years ago, and still common in every greenhouse. The stem is very much and determinately branched. Leaves rather above half an inch long, crowded, spreading in every direction, bright green, somewhat hairy, linear-lanceolate, revolute, with a narrow hairy furrow beneath. Flowers in small terminal heads, conspicuous for the snow-white tufted woolliness which crowns their calyx, like what is seen on the corolla of a *Leucopogon*; see that article.

*Ph. bicolor.* White and yellow Phylica. Linn. Mant. 208. Willd. n. 3. (*Ph. strigosa*; Thunb. Prodr. 44?)—Leaves linear, revolute, hairy, scattered; woolly beneath. Flowers hairy, longer than the floral leaves.—Found in sandy ground at the Cape, but a stranger to our gardens. Twice as large in every part as the former, with which its habit and foliage otherwise nearly agree; but the pubescence of the calyx consists in long straight silky hairs, not opaque white woolliness, and the flowers are accompanied by numerous crowded floral leaves, densely clothed with similar, but tawny, hairs. We have seen no specimen of Thunberg's *strigosa*, and therefore follow Willdenow in citing him with a mark of doubt, though his specific character leaves scarcely any room for hesitation:

*Ph. stipularis.* Horned Phylica. Linn. Mant. 208. Willd. n. 9. Ait. n. 7. (*Chamælea foliis angulis subtus incanis*, *floribus capitatis muscosis*; *Burm. Afr. 117. t. 43. f. 2.*)—Leaves linear, revolute. Stipulas acute. Segments of the calyx elongated, awl-shaped, externally woolly.—Introduced by Mr. Masson in 1786, but has not yet blossomed. This is distinguished by a pair of minute, awl-shaped, acute, brownish stipulas, situated rather within the insertion of the footstalk, as in the genus *Pultenæa*; and by the remarkably long woolly points of the calyx, which had induced Linnæus, at one period, to call the species *cornuta*.

*Ph. pinifolia.* Pine-leaved Phylica. Linn. Suppl. 153. Willd. n. 10. Ait. n. 8.—Leaves linear, flat on both sides, very smooth. Spikes paniced. Flowers smooth; each about as long as its solitary ovate bractea.—Native of lofty mountains. Remarkable for its great smoothness, and flat fir-like leaves. The smoothness and form of the minute flowers are such, that Burmann mistook it for a species of *Bæckea*, nor is its habit dissimilar from that otherwise very remote genus.

*Ph. buxifolia.* Box-leaved Phylica. Linn. Sp. Pl. 283.

Willd. n. 13. Ait. n. 10. (*Chamælea foliis subrotundo subtus incano*, *floribus in capitulum collectis*; *Burm. Afric. 119. t. 44. f. 1.*)—Leaves ovate, scattered or ternate; downy beneath.—Common in collections, flowering most part of the year. The leaves are rather elliptical, pointed, almost an inch long, and half an inch wide; rough with points, and of a dark shining green, above; covered beneath with dense white wool. Flowers numerous, in little round terminal white heads.

*Ph. racemosa.* Racemose Smooth Phylica. Linn. Mant. 209. Willd. n. 18.—Leaves ovate, dotted, smooth, or slightly fringed. Spikes paniced. Flowers smooth; each about as long as its solitary heart-shaped bractea.—Found about ditches at the Cape, but not yet brought to England. The flowers and inflorescence nearly resemble *pinifolia*, inasmuch that this species was likewise made a *Bæckea* by Burmann in his *Prodromus*. The short, broad ovate leaves, rough with minute dots, and often fringed with hairs, abundantly distinguish it from *pinifolia* and every other. The branches are hairy.

PHYLICA, in *Gardening*, contains plants of the shrubby, evergreen, exotic kind,—bastard alaternus,—of which the species cultivated are; the heath-leaved phylica (*P. ericoides*); the woolly-leaved phylica (*P. plumosa*); and the box-leaved phylica (*P. buxifolia*).

*Method of Culture.*—They are chiefly increased by cuttings and slips of the young shoots. In spring, as about March or April, a quantity of young cuttings, or slips of the small shoots, should be taken off, planting them in pots of rich earth, plunging them in a hot-bed, or in the bark-bed in the stove; giving frequent waterings, and occasional shade from the sun, when they will soon emit roots, and become proper plants fit for potting off separately in autumn: or the young cuttings or slips may be planted any time in summer, particularly in June and July, in pots as above, and placed under a hot-bed frame, or covered close with hand-glasses, being watered and shaded; when they will also grow, but not to be so forward as those of the spring planting.

These are somewhat tender plants, requiring shelter in winter in this climate: of course they must always be kept in pots, and placed among the greenhouse exotics, where they will effect a very agreeable variety at all seasons, and flower annually a great part of the autumn and winter, but do not produce seed in this climate.

PHYLITÆ, in *Ancient Geography*, a people of India, on this side of the Ganges; placed by Ptolemy with the Bittigi, near the river Nanaguna.

PHYLACHNE, in *Botany*, received that appellation from Forster, in allusion to the slender chaffy aspect of its foliage and calyx, the word being derived from *φυλλον*, a leaf, and *αχνη*, a bush. *Forst. Gen. t. 58. Linn. Suppl. 62. Schreb. 672. Mart. Mill. Dict. v. 3. Swartz in Sims and König's Ann. of Bot. v. 1. 286. t. 5. Juss. 422. Lamarek Illustr. t. 741.*—Class and order, *Gynandria Diandria*. *Nat. Ord.* akin, at least, to the *Campanaceæ* of Linn. and Juss. See *FORSTERA*, with which genus Swartz has united the above-mentioned.

PHYLLAMPHORA, from *αμφορες*, a wine jar, and *φυλλον*, a leaf, a name given by Loureiro, in his *Cochinch. 606*, to the Linnæan *NEPENTHES*, see that article, in allusion to the pitcher-like appendage to the leaf. The author had a suspicion that his plant might be that of Linnæus, but he could not make it tally with the description. There is, however, no doubt of their identity.

PHYLLANTHUS, from *φυλλον*, a leaf, and *ανθος*, a flower, because the flowers, in one of the original species, grow

grow out of the leaves; but that species is now a *Xylophylla*. Pliny has a *Phyllanthus*, of which we know enough only to prove that it is different from our's. Linn. Gen. 484. Schreb. 628. Willd. Sp. Pl. v. 4. 573. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 5. 333. Juss. 386. Lamarck Illustr. t. 756. Gært. t. 108. Clafs and order, *Monocia Monadelphica*. Nat. Ord. *Tricocœ*, Linn. *Euphorbia*, Juss.

Gen. Ch. Male, *Cal.* Perianth of one leaf, bell-shaped, coloured, in six deep, ovate, obtuse, spreading, permanent segments. *Cor.* none, except the calyx be taken for such. *Stam.* Filaments united into a column; anthers three, two-lobed.

Female, on the same plant, and in the same situation, as the male, *Cal.* Perianth as in the male. *Cor.* Petals none. Nectary a border with 12 angles, furrounding the germen. *Pist.* Germen superior, roundish, with three blunt angles; styles three, spreading, cloven; stigmas obtuse. *Peric.* Capsule roundish, with three furrows, three cells, and six elastic valves. *Seeds* solitary, roundish.

Ed. Ch. Male, Calyx in six deep segments. Corolla none. Filament columnar. Anthers three.

Female, Calyx in six deep segments. Petals none. Nectary a border with twelve angles. Styles three. Capsule three-lobed, with six elastic valves.

Obf. Willdenow describes *Pb. obovatus* with six anthers.

Much uncertainty has existed, and does still exist, respecting the plants that strictly belong to this genus. Linnæus has but six species in the 2d edition of Sp. Pl. and seven in the 14th ed. of Syst. Veg. He always considered *Phyllanthus* as having three separate itamens, but this is certainly a mistake, at least as far as we have been able to examine. Willdenow has augmented the genus to 36 species, and he wishes to unite with it the whole of *Xylophylla*, Willd. Sp. Pl. v. 1. 1500, making seven species more. We conceive the latter proposal to be inadmissible, and these genera are kept distinct in the recent edition of Hort. Kew. though placed next to each other in the *Monocia Monadelphica*. This last point will be considered hereafter, when we come to XYLOPHYLLA. Nine species of *Phyllanthus* are enumerated as cultivated in the British collections, where they are mostly stove shrubs, chiefly remarkable for their delicate pinnate foliage, resembling some *Mimosa*, and turning red in decay. Many of them, however, have simple leaves. The flowers are small, greenish, axillary, copious, on short slender stalks. Very few of the species are figured in any botanical works, and none in our periodical ones. We shall enumerate a few species.

*Ph. obovatus.* Annual Carolina Phyllanthus. Willd. n. 3. Ait. n. 1. (*Ph. carolinensis*; Michaux Boreal-Amer. v. 2. 209.)—Leaves simple, obovate, bluntish. Flowers axillary, stalked, in pairs. Stem branched, round, erect. Native of North America. It was introduced in 1803 by Robert Barclay, esq. to whom the gardens are indebted for several of the more curious, though less ostentatious, American plants, overlooked by vulgar collectors and admirers. The present is a hardy annual, flowering in July and August. Stem much branched. Leaves stalked, alternate, not an inch long, entire, smooth; bright green above; paler beneath. Stipules small, membranous. Flowers small, greenish, one male, the other female. Capsule scarcely fo big as hemp-seed.

*Ph. bacciformis.* Berry-shaped Phyllanthus. Linn. Suppl. 415. Willd. n. 25. König in Ann. of Bot. v. 1. 357. (*Agyneia impubes*; Venten. Jard. de Cels. t. 23; but not of Linnæus.)—Leaves two-ranked, elliptical. Branches two-edged. Flowers axillary; the upper ones fe-

male, solitary; the lower male, three together.—Native of Tranquebar. Root annual. Stems numerous, spreading widely, beset with numerous leafy branches. Leaves broadly elliptical, hardly an inch long. Stipules awl-shaped. Flowers green. Mr. König has shewn the mistake of M. Ventenat, in supposing this the true *Agyneia impubes* of Linnæus, who is thereby vindicated from the abundance of errors in the description, with which the learned, not uncaudid, Frenchman rather too hastily charges him. The *Agyneia* in question is figured in the above Ann. of Bot. t. 7. f. 4.

*Ph. Emblica.* Shrubby East Indian Phyllanthus. Linn. Sp. Pl. 1393. Willd. n. 36. Ait. n. 9. (*Myrobalanus Emblica*; Rumph. Amboyn. v. 7. 1. t. 1. Nilicamaram; Rheede Hort. Malab. v. 1. 69. t. 38.)—Leaves pinnate, bearing the flowers; leaflets oblong, rather acute; footstalks round, downy. Flowers aggregate. Stem shrubby. Native of the East Indies; long cultivated in our stoves. No time for its blossoming is marked in the Hort. Kew. but we had a flowering specimen from Mr. Salisbury's collection in 1788. The leaves are elegantly tinged with red. We can hardly believe them to be really pinnate and floriferous, but should rather consider as branches, what are termed their common footstalks, and from the lower part of which copious axillary tufts of little yellowish flowers come forth. The fruit is as large as an ordinary gooseberry, and is figured under the name of *Emblica*, in Gærtner t. 108. It does not appear to be more pulpy than that of other species.

PHYLLANTHUS, in Gardening, furnishes plants of the evergreen exotic tree and shrubby kind: the sea-side laurel, of which the species cultivated are, the annual phyllanthus (*P. niruri*); the great-leaved phyllanthus (*P. grandifolia*); and the shrubby phyllanthus (*P. emblica*).

*Method of Culture.*—These plants, where seeds can be procured from their native situations, may be raised in that way. They should be sown in pots filled with light earth, and plunged in a hot-bed; and when the plants have acquired some growth, they should be planted out into separate pots filled with the same sort of mould; being replunged in the hot-bed, due shade and water being given, until they become perfectly rooted; after which they should be constantly kept in the bark-bed of the stove, and have the management of other plants of the same tender sort.

They may also sometimes be raised by planting out slips, or by layers managed in the same way as those from seeds.

They afford a fine variety in their beautiful foliage, and the flowery kinds have a singular effect in their flowers.

PHYLLOUREA, in Botany, a hybrid Greek and Latin name, from *φυλλον*, a leaf, and *aureus*, golden, given by Loureiro to the *Croton variegatum* of other authors, of which he makes a distinct genus; Lour. Cochinch. 575. We greatly doubt the propriety of the measure, and the name is certainly inadmissible.

PHYLLEIUS, in Ancient Geography, the name of a country, a mountain, and a town of Macedonia.

PHYLLIREA, in Botany. See PHILLYREA.\*

PHYLLIS is, by Linnæus, in his Philoſophia Botanica, reckoned among the poetic names, familiar in ancient story, like *Hyacinthus*, *Narcissus*, &c. But in his Hortus Cliffortianus, he mentions having particularly chosen this appellation for the plant which now bears it, because the beauty of the shrub chiefly consists in its leaves. *Phyllis* would have been more peculiarly apposite for any shrub or tree producing an exuberant foliage suddenly from naked branches, like the Almond, into which the unfortunate Thracian queen was supposed to be metamorphosed.

Linn. Gen. 126. Schreb. 177. Willd. Sp. Pl. v. 1. 1354. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 2. 114. Juss. 198. Lamarck Illustr. t. 186. Gærtn. t. 25. Clafs and order, *Pentandria Digynia*. Nat. Ord. *Stellate*, Linn. *Rubiaceæ*, Juss.

Gen. Ch. *Cal.* Perianth fuperior, obfolete, of two minute leaves. *Cor.* Petals five, lanceolate, obtufe, revolute, fcarcely connected at the bafe. *Stam.* Filaments five, fhorter than the corolla, capillary, flaccid; anthers fimple, oblong. *Pijl.* Germen inferior, obovate; ftyle none; ftigmas two, awl-shaped, downy, reflexed. *Peric.* none. Fruit oblong, fomewhat turbinate, obtufe, angular. *Seeds* two, parallel, convex and angular at the outer fide, flat at the inner, broader upwards.

Eff. Ch. Stigmas rough. Calyx of two leaves. Petals five. Seeds two.

Obf. Linnæus remarks that the ftigmas refemble thofe of the graffes, the elm, and *Tetragonia*. He feems originally to have had, like Boerhaave, who called this plant *Bupleuroides*, an idea of its affinity to the umbelliferous order; but he has juftly referred it fubfequently to his *Stellate*; fo that what regards the inflorefcence in his *Genera Plantarum* is entirely mifplaced.

1. Ph. *Nobla*. Baftard Hare's-car. Linn. Sp. Pl. 335. (*Valerianella canarienfis frutefcens*, *Simpla nobla dicta*; Dill. Elth. 405. t. 299. *Bupleuroides*; Walth. Hort. 11. t. 6.)—Native of the Canary iflands, where it is called *Simpla nobla*. It has been known for above a century in our gardens, where it is kept in the greenhouse, and flowers in June and July, but is valued rather for variety than beauty. The *ftem* is shrubby, two or three feet high, with round fmooth leafy branches; the lower part of a light corky afpect. *Leaves* oppofite, on ftalks, elliptic-lanceolate, acute, entire, fmooth, two or three inches long. *Stipulas* between the footftalks, oblong, erect, ftrongly toothed and glandular, efpecially the upper ones. *Panicle* terminal, leafy, oblong, fmooth, of numerous fmall green flowers. *Fruit* the fize of a grape-ftone.

This is the only known fpecies of its genus, *Ph. indica*, Sp. Pl. 336, being ftruck out by Linnæus in his *Mantiffa altera*, 349.

PHYLLIS, in *Gardening*, contains plants of the shrubby, evergreen, exotic kind, of which the fpecies cultivated is the baftard-hare's-ear (*P. nobla*).

*Method of Culture*.—The plants may be increafed by fowing the feeds in the early fpring months, as about March, in pots filled with light earth, and plunged in a hot-bed; and when the plants have attained fome growth, they fould be planted out in feparate pots, replunging them in the hot-bed, due fhade being given till they become well rooted. In the fummer feafon they fould be fet out in a fheltered fituation, fo as to have the morning fun, and be frequently watered. In the winter they muft be well fheltered from froft, but have as much air as poffible in mild weather.

In the fecond year, when the plants are fhaken out of the pots and placed in a proper fituation in the open ground, they flower better, and afford more perfeft feeds, than when kept in pots.

They may alfo be raifed by cuttings planted out in the fummer feafon.

New plants fould be raifed every two or three years, as they do not laft long.

They afford an agreeable variety among other evergreen plants of the greenhouse kind.

PHYLLITIS MARINA, in *Natural Hiftory*. See HART'S *tongue*.

PHYLLOBOLIA, *φυλλόβολια*, in *Antiquity*, a cultom

that prevailed among the ancients to ftrew flowers and leaves on the tombs of the dead. The Romans adopted this cultom from the Greeks, and added likewife wool. See BURIAL.

The phyllobolia was alfo ufed on occafion of a victory obtained at any of the public games; when not only the victors, but likewife their parents, were ftrewed with flowers and leaves.

PHYLLODES, in *Botany*. See PHRYNIUM.

PHYLLOMA, fo named by Mr. Ker in Curtis's Magazine, from *φυλλος*, a leaf, and *λαμα*, a fringe or border, alluding to the coloured toothed margin of the leaves. Ker in Curt. Mag. v. 38. 1585. Clafs and order, *Hexandria Monogynia*. Nat. Ord. *Coronaria*, Linn. *Aphodeli*, Juss.

Gen. Ch. *Cal.* none. *Cor.* Petals fix, oblong, nearly erect, equal, cohering by their claws; three of them internal. *Stam.* Filaments fix, inferted into the receptacle, thread-shaped, erect, equal, rather fhorter than the corolla; anthers oblong, incumbent. *Pijl.* Germen fuperior, roundifh, three-lobed; ftyle awl-shaped; ftigma fimple. *Peric.* Berry tough, fpherical, deprefled, with three furrows, and three cells. *Seeds* numerous in each cell, in two rows, horizontal, oblong, angular, polished.

Eff. Ch. Corolla of fix petals, erect. Filaments thread-shaped. Berry of three cells. Seeds numerous, angular.

1. Ph. *marginatum*. Aloe-leaved Phylloma. (*Ph. aloiflorum*; Curt. Mag. t. 1585. *Dracæna marginata*; Ait. Hort. Kew. ed. 1. v. 1. 454. ed. 2. v. 2. 277. Willd. Sp. Pl. v. 2. 157.)—The only known fpecies, faid to be a native of the ifland of Bourbon. M. Richard is mentioned as having fent it to Kew in 1766. There is a fine fpecimen of this plant in the ftove at Chelfea, which flowers in the fpring, and often ripens fruit. The *ftem* is shrubby, feveral feet high, and probably forming, in its native country, a fmall and thick tree, with all the appearance of an arborefcent *Aloc*. *Leaves* a yard long, fucculent, fmooth, taper-pointed, green, with a dull red, ftrongly toothed, or jagged, edge. *Common flower-ftalk* axillary, compressed, fimilarly coloured, but not toothed, at the edges; *partial* ones alternate, round, fpreading, red. *Flowers* numerous, racemofe, each fcarcely an inch long, of a tawny yellow. *Bractææ* folitary, taper-pointed, red. *Fruit* purplifh-black, nearly the fize and fhape of a bullace plum.

The even *filaments*, and numerous *feeds*, well diftinguifh this, as a genus, from *Dracæna*. Its habit is like *Aloc*, but their characters are fufficiently different. We retain the excellent original fpecific name, as far preferable to *aloiflorum*, and certainly requiring no alteration.

PHYLLIOS, in *Ancient Geography*, a country of the Peloponnefus, in Arcadia, according to Statius in his *Thebaid*.

PHYLLUS, a town of Theffaly, in which Strabo has placed a temple of the Phyllæan Jupiter.

PHYLOBASILES, *φυλοβάσιλις*, among the Athenians, magiftrates, who, with refpect to particular tribes, had the fame office that the *bafileus* had with refpect to the commonwealth.

They were chofen out of the eupatride or nobility, had the care of public facrifices, and other divine worfhip peculiar to their refpective tribes, and kept their court in the portico called *bafileion*, and fometimes in the *bucolician*.

PHYMA, *φυμα*, from *φυμαί*, to grope, as plants from the earth, a term ufed by the ancients to denote almoft every fpecies of external and fuperficial tumour, arifing without any obvious external injury. It comprehends, therefore, boils, glandular enlargements, cutaneous tubercles, and even large inflamed puftules, or fmall abfcelfes. See Galen; in

in Comment. ad bib. vi. Epidem. Celsus, de Med. lib. ii. cap. 7.

PHYMA, in *Surgery*, any superficial inflammatory swelling, which quickly falls into a state of suppuration.

PHYMOSIS. See PHIMOSIS.

PHYRAMA, in the *Materia Medica*, a name given by some of the old writers to the gum ammoniacum, particularly to that part of it which was soft and ductile between the fingers. It is not clear that the gum ammoniacum of those times was the same thing which we now know by that name; at least it is certain, that the other kind of it, which they called *thrauma*, or *ammoniacum thraulsum*, was not; for Dioscorides describes this as being of a reddish-brown colour, and very friable; and Avicenna says, that it marked a fine yellow or gold colour upon paper. These are properties by no means agreeing with our gum ammoniacum; and if justly applicable to that, must prove that it could not be the same; and the characters given by Avicenna of its bitterness, and making a yellow stain upon paper, seem to make it the gamboge. This, however, by no means can agree with the other virtues attributed to it.

PHYSALIS, in *Botany*, *σκυζαν*; of the Greeks, from *σκυζω*, a bladder, an old name, applied by Linnæus to the *Alkekengi* of some preceding writers, the bladder inflated calyx of which it well announces.—Linn. Gen. 99. Schreb. 134. Willd. Sp. Pl. v. 1. 1019. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 1. 392. Brown Prodr. Nov. Holl. v. 1. 447. Juss. 126. Lamarek Illustr. t. 116. Gærtn. t. 131. (*Alkekengi*; Tourn. t. 64.)—Class and order, *Pentandria Monogynia*. Nat. Ord. *Lurida*, Linn. *Solanææ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, swelling, small, five-sided, cut half way down into five pointed segments, permanent. *Cor.* of one petal, wheel-shaped; tube very short; limb large, plaited, cut half way down into five broad acute segments. *Stam.* Filaments five, awl-shaped, very small, converging; anthers erect, approaching each other. *Pist.* Germen superior, roundish; style thread-shaped, rather longer than the stamens; stigma obtuse. *Peric.* Berry nearly globose, of two cells, small, within the enlarged, inflated, closed, five-sided, coloured calyx. *Receptacle* kidney-shaped, double. *Seeds* numerous, kidney-shaped, compressed.

Eff. Ch. Corolla wheel-shaped, plaited. Anthers converging, bursting lengthwise. Berry of two cells, within the inflated, angular, membranous calyx.

A genus of lurid, chiefly downy, viscid and fetid plants, almost entirely extra-european, whose fruit in several instances is eatable, though principally valuable only for an acidity, grateful in hot climates. The species are by no means clearly ascertained, as many of them nearly resemble each other, and few are cultivated except for curiosity; their vulgar dunghill aspect, and rank growth, being hardly compensated by the slight beauty of their flowers, or the singularity of the bladdery calyx. Linnæus has ten species in his Sp. Pl.; thirteen in Syst. Veg. ed. 14. Willdenow reckons up seventeen, fourteen of which are mentioned in Hort. Kew. Mr. Brown has added one, from New Holland. Ten are perennial, and six of those are shrubby; seven are annual, and very much branched.

In the first section are

*Ph. somnifera*. Clustered Winter-cherry. Linn. Sp. Pl. 261. Willd. n. 1. Ait. n. 1. Cavan. Ic. v. 2. 2. t. 103. (*Solanum somniferum*; Matth. Valgr. v. 2. 417. Ger. Em. 339.)—Stem shrubby. Branches straight. Flowers crowded—Native of Mexico; naturalized, apparently, in Spain. It requires the protection of a green-

house in England, where it has been cultivated from the time of Gerarde to the present day, flowering in July and August. The whole plant is downy, of a pale dull green. *Leaves* ovate, entire, about an inch or two long, scattered, on shortish stalks. *Flowers* small, pale and inconspicuous, crowded among the leaves along the branches. *Fruit* scarlet, the size of a black currant, concealed by the greenish downy calyx. The bark of the root is said to be a safe opiate, milder than opium.

The *Atropa frutescens* of Linnæus is so like this plant in habit, that he justly observes they can hardly belong to different genera; and Cavanilles has, we think not improperly, referred that *Atropa*, though ignorant of its being already described, to *Physalis*, by the name of *suberosa*, in his Ic. t. 102. The calyx, though not closed, is sufficiently inflated in its lower part to excite this measure.

*Ph. viscosa*. Clammy Winter-cherry. Linn. Sp. Pl. 261. Willd. n. 7. Ait. n. 6. Jacq. Hort. Vind. v. 2. 64. t. 136. (*Alkekengi bonariense repens, baccâ turbinatâ viscosâ*; Dill. Elth. 11. t. 10.)—Leaves wavy or toothed, obtuse, slightly downy. Stem herbaceous; the upper part cymose. Fruit umbellicated, viscid.—Native of the Brasils; a greenhouse plant in England, but rarely kept, flowering in July. The root is creeping. *Flowers* of a very pale uniform yellow, without spots. *Berry* scarlet, covered with a viscid fluid, and enclosed in a downy calyx.

*Ph. Alkekengi*. Common Winter-cherry. Linn. Sp. Pl. 262. Willd. n. 9. Ait. n. 8. Sm. Fl. Græc. Sibth. t. 234, unpubl. (*Solanum Halicacabum*; Matth. Valgr. v. 2. 416. Ger. Em. 342.)—Leaves two together, acute, nearly entire. Stem herbaceous, somewhat branched below. Root creeping.—Native of shady rocky places in the south of Europe, very hardy in our gardens, where it spreads widely by means of its perennial creeping roots; flowering in June, but chiefly remarkable for its large, orange-coloured, permanent, drooping calyces, enclosing fruit of the same colour, and used for decorating many a rustic chimney-piece during winter. The stems are scarcely above 12 or 18 inches high. *Leaves* dark green. *Corolla* white. Dioscorides speaks of the berries as used, with other plants, to twine into garlands; and he records their medical qualities of curing the jaundice, and promoting the urinary secretion. For the latter quality they are celebrated in Lewis's Dispensatory, under the name of *Alkekengi*, though excluded from the more concise Pharmacopœia of the College.

Among the reputed annual species are,

*Ph. pubescens*. Downy Winter-cherry. Linn. Sp. Pl. 262. Willd. n. 12. Ait. n. 11. Brown Prodr. Nov. Holl. v. 1. 447. Fl. Peruv. v. 2. 41. (*Ph. edulis*; Sims in Curt. Mag. t. 1068. *Alkekengi virginianum, fructu luteo, vulgò Capuli*; Feuill. Peruv. v. 3. 5. t. 1. f. 2.)—Stem angular, much branched. Leaves heart-shaped, somewhat waved, downy. Flowers pendulous. Calyx-teeth sharp.—Native of the warmer parts of America, but now naturalized in the East Indies, at the Cape of Good Hope, and even at Port Jackson, New South Wales, where Mr. Brown informs us it is very plentiful, and known by the name of the Cape Gooseberry, the berries being eaten, either raw, or in various articles of cookery. Dr. Sims speaks of this fruit as agreeably acid and sweet, with a fragrance like a mixture of apple and melon, and he says the plant is perennial and evergreen in a stove, though usually reckoned herbaceous and annual. The flowers are pale yellow, with five large purple spots. The calyx of the fruit is nearly globular, ribbed, tawny. *Berry* yellow. This may be the same with the Linnæan *Ph. peruviana*, but we find nothing positive on that subject.

*Ph. parvi-*

*Ph. parviflora.* Small-flowered Winter-cherry. Br. Prodr. Nov. Holl. v. 1. 447.—Stem angular, diffuse. Branches wavy. Leaves ovate, downy, nearly entire. Calyx-teeth acute. Seeds dotted.—Found by Mr. Brown in the tropical part of New Holland. *Root* annual. *Anthems* yellow.

*Ph. prostrata.* Trailing Winter-cherry. L'Herit. Stirp. 43. t. 22. Willd. n. 17. Ait. n. 14. Andr. Repof. t. 75. Jacq. Ic. Rar. t. 38.—Stem procumbent, much branched, round, hairy. Leaves ovate, wavy, somewhat fleshy.—Native of Peru, from whence it was brought by Dombey to the French gardens, and thence introduced amongst us. It is a very tender annual, impatient of cold or wet while young, but in a hot dry summer it bears the open air, and is conspicuous for a profusion of delicate bright blue flowers. The berry is small, dull purple, or brown.

PHYSALIS, in *Gardening*, comprises plants of the herbaceous and shrubby ornamental kind, of which the species cultivated are, the tooth-leaved winter cherry (*P. angulata*); the woolly winter cherry (*P. pubescens*); the common winter cherry (*P. alkekengi*); the Pennsylvanian winter cherry (*P. pensylvanica*); the clammy winter cherry (*P. viscosa*); the clustered winter cherry (*P. foeniculifera*); the flexuous Italian winter cherry (*P. flexuosa*); the tree-like physalis, or winter cherry (*P. arborefcens*); and the Curassavian winter cherry (*P. curassavica*).

In the first fort there is a variety which is taller, with entire leaves, smaller flowers of a paler yellow colour.

*Method of Culture.*—All these plants are capable of being increased by seeds; the second, third, fourth, and fifth forts, also by parting the roots; the sixth, seventh, eighth, and ninth, likewise by cuttings.

In the first fort, the seed should be sown in the early spring, as April, in pots of light earth, plunging them in a moderate hot-bed. When the plants have acquired a few inches in growth they should be removed into separate pots, gradually inuring them to the open air, in order that they may be removed with balls into the clumps or borders. But it is probably a better method to sow them in the latter end of May in the places where they are to remain, as they do not bear transplanting well. They must be raised annually.

In the herbaceous kinds the seeds should be sown in the autumn as soon as they are ripe, or early in the spring, in the beds, borders, or clumps where they are to remain; or they may be transplanted into other beds to remain till the following autumn, when they may be removed to the situations where they are to remain.

The roots may be parted either in the early autumn or spring season, when the weather is mild. The divided parts should have root-fibres left at the bottoms and a bud in each at the tops in order to their succeeding properly.

In the sixth and seventh forts, the seed should be sown in pots of light mould in the early spring and plunged in a mild hot-bed. When the plants have had a little growth they should be pricked out into separate small pots, proper shade and water being given; being afterwards managed as the shrubby exotics of less tender plants.

They may likewise be raised from cuttings made in the latter spring or summer months, which should be placed in pots of light mould and plunged in the hot-bed, due shade and water being given till they have stricken root.

And the two last forts may be raised from seeds or cuttings in the same way, by the aid of the bark hot-bed of the stove.

The first and the other herbaceous forts are curious ornamental plants in the borders, clumps, and other parts of

pleasure-grounds, and the four best shrubby forts in the greenhouse and stove collections.

PHYSALUS, a name given by Rondeletius to a species of sea-insect, of the scolopendra marina kind, supposed by some to be the same with the scolopendra marina, or centipes, of the Irish sea, described by Molyneux; but this does not appear to be the case, on a strict enquiry. The physalus of Rondeletius has no mouth, whereas the sea centipes of Ireland has a remarkably large one; that of Rondeletius is wider in the middle, and tapers at each end; but the Irish kind is largest at the head, and tapers from thence all the way to the tail. Rondeletius's has tubercles on the back, but the Irish one has only hairy stripes, and his is a poisonous animal, whereas that of Ireland was found in the stomach of a cod-fish, which had eaten it as food. The figure given by Rondeletius agrees also very well with the account he gives, but not with the figure of that drawn upon the spot from the Irish fish, and given in the Philosophical Transactions. On the whole, nothing is more plain than that these are two distinct species of animals, though of the same genus, Phil. Trans. N<sup>o</sup> 225. See SCOLOPENDRA.

PHYSALUS, in *Zoology*, a species of Balæna, with a double opening to the spiracle on the middle of the fore-part of the head; and a soft fin on the hinder part of the back; the balæna, having three fins and a smooth belly, of Brisson; the balæna, without teeth, having a narrow body and a fin on the back, of Ray; the physalus bellua, physeter of Gesner; the physeter of Pliny, Willoughby, and others; the fin-fiske of Egede, &c.; the fin-whale of Pennant's Arctic Zoology; the fin-fish of the British Zoology; and the fin-backed whale of Dudley, Phil. Trans. abr. vii. 425. This fish inhabits the Atlantic both on the American and European coasts. It is equal in length to the common whale, but not above a third, or even fourth part of the circumference, and produces much less blubber; the opening of the mouth is larger; the horny lamina, or whale-bone, are shorter, and of a blueish colour. Its flesh is better tasted; and it throws the water from the spiracles with greater force. The upper part of the body of this animal is of a clear brown colour, and the lower parts white; the lips are brown and resemble a twisted rope; on the lower part of the back, near the tail, there is a straight, soft, sharp-pointed fin, between three and four feet long, without rays or bones, from which circumstance the English name of the species, to distinguish it from the common whale, having no back fin, is derived. From the violence with which this species throws out the water from its spiracle, it is supposed to be the *Κυσαλος* of the ancients. This species feeds on small fishes of the clupea, scomber, and other genera. It is neglected by the whale-fishers, on account both of its great fierceness and the small quantity of blubber which it affords: even its appearance in the whale seas is disliked, as it is supposed to drive away the common species, which is so much in request.

PHYSARUM, in *Botany*, a genus of *Fungi* in Perfoon's Syn. 168, whose species are by other writers referred either to *Trichia* or *Reticularia*. Bulliard has described some of them under the name of *Sphaerocarpus*, which properly belongs to one of the *Hepaticæ*, as we propose to shew in its proper place. Perfoon's character of *Physarum* is as follows.

Case rigid, simple, mostly somewhat rugged, and rather powdery. Threads internal, scattered, mostly adhering like network to the case. He defines 16 species, all small, found either on the trunks of trees, on the ground, or amongst moss.

PHYSICA, or PHYSCÆ, in *Ancient Geography*, a town of the

the Lower Mæria, between the mouths of the rivers Axia-cus and Tyras. Ptolemy.

PHYSCÆ, a town of Macedonia, in Mygdonia, between Barus and Terpillus. Ptolemy.

PHYSCILLA, a town of Macedonia, on the gulf Mecybernæus, according to Pliny and P. Mela.

PHYSCIA, in *Botany*, from  $\varphi\upsilon\sigma\kappa\iota\varsigma$ , a bladder, alluding to the concave or inflated receptacles, or shields, of some species; see LICHENES, n. 20.

PHYSCONIA, in *Medicine*, probably from  $\varphi\upsilon\sigma\kappa\iota\varsigma$ , an inflated bladder, a term used by the nosologists to express every species of abdominal tumour, which is hard, not sonorous like tympanites, nor fluctuating like dropsy, nor produced by pregnancy. Under the appellation of Phylconia a great variety of morbid enlargement in the abdomen is, therefore, necessarily included; such as scirrhus, fatty, and other tumours of the omentum, morbid growth connected with the ovaria, or uterus, with the intestines or mesentery, with the liver, kidneys, &c. As these tumours are, in fact, extremely different in their nature and origin, the method of treatment appropriate to each can only be determined by an investigation of each variety; but it must be acknowledged, that, as they result from actual organic change in the structure of the parts diseased, little that is effectually curative is within the reach of art. See Sauvages, *Nofol. Meth.* class x. genus 8.

PHYSCUS, in *Ancient Geography*, a town of Asia Minor, upon the coast of the Doride, over-against the island of Rhodes, according to Diodorus Siculus. Strabo says that it had a port. It was called Phycia by Steph. Byz. and Phusca by Ptolemy.—Also, a port of Asia Minor, in Caria, N.E. of mount Loryma, W. of the promontory Pedalium. In this port there were a town and a river of the same name.—Also, a town of Greece, in the country of the Locri Ozoli. Plutarch.—Also, a port of the island of Rhodes.—Also, a river of Asia, in the vicinity of Assyria.—Also, a mountain of Italy, in Magna Græcia, near Crotona.

PHYSETER, the *Cachalot*, in *Ichthyology*, a genus of animals of the class and order Mammalia Cete, of which the generic character is, teeth in the lower jaw, and none in the upper. The name physeter is of Greek origin, and is derived from the verb  $\varphi\upsilon\sigma\alpha\iota$ , to blow. It has this name from its quality of taking in a great quantity of sea-water, and then blowing it out again with great force and violence. There are four species in the Linnæan system by Gmelin, which are as follow.

#### Species.

\* CATODON; lesser Cachalot. It has no dorsal fin; but a fistula or spiracle on the snout. It is about 25 feet in length; inhabits the Northern sea, and has been found on the coast of Scotland. The head is round, and the mouth small. In its general structure is very nearly allied to the macrocephalus, to be next described, but the mouth is smaller.

\* MACROCEPHALUS; blunt-headed Cachalot. This has no dorsal fin, but the fistula is on the neck. This is one of the largest species of whales, often measuring sixty feet. The head is of an enormous size, constituting more than a third of the animal; the mouth is wide; the upper lip rounded, thick or high, and much broader than the lower, which is of a sharpish form, sitting as it were into a longitudinal bed or groove. The teeth that are visible are situated only in the lower jaw, and, when the mouth is closed, they are received into so many corresponding holes or cavities in the upper; they are numerous, rather blunt, and of a conical form, with a slight bend or inclination inwards. The

front of the head is very abrupt, descending perpendicularly downwards, and on its top, which has been improperly termed the neck by some authors, is an elevation or angular prominence containing the spiracle, which appears externally simple, but is double within. The head is distinguished or separated from the body by a transverse furrow or wrinkle. The eyes are small and black; and the ears or auditory passages extremely small. About the middle of the back is a kind of spurious fin or dorsal tubercle, of a callous nature, not moveable, and somewhat abrupt or cut off behind. The tongue is of the shape of the lower jaw, clay-coloured externally, and of a dull red within. The throat is small; the body cylindrical beyond the pectoral fins, growing narrower towards the tail. The colour of the whole animal is black, but as it grows old it becomes whitish beneath. It swims very swiftly, and is said to be a violent enemy to the white shark. (See SQUALUS.) The Greenlanders use the flesh, oil, tendons, &c. in the same manner as they do those of the Narwhal. (See MONODON.) This species of whale is reckoned difficult to catch, being very tenacious of life, and surviving several days the wounds that it receives from its pursuers. It has a vast cavity within the upper part of the head, in which spermaceti is found. This, when fresh, is nearly fluid; but when exposed to the air it concretes into opaque masses. The celebrated perfume ambergris is found in masses in the intestines, being the fæces of the whale when it is sick. (See AMBERGRIS.) The three varieties of this species are; 1. Black; back gibbous. Found in European seas. 2. Blackish-ash, with a gibbous back, which inhabits the coasts of New England, and is from sixty to seventy feet in length. 3. Whitish, with a smooth back. This last is found in Davis's straits, is only about fifteen feet long, of a yellowish-white; teeth a little incurvate, compressed, rounded at the tips.

\* MICRONS; Sharp-nosed Cachalot. The dorsal fin of this species is long; and the upper jaw is longer than the lower. There are two varieties; in the *first* the teeth are sharp and hooked; it is about seventy feet long, is of a dark tawny colour; has forty-two teeth round, a little compressed; dorsal fin long and sharp: in the second the teeth are sharp and straight; this is from eighty to one hundred feet in length; the upper parts are blackish, and beneath it is white; it has a high bunch on the upper part of the back; the fin is near the tail; the eyes are bright yellowish; the tongue small and acute; the teeth are set in the jaw like a saw. This species swims swiftly, and is said to be a great enemy to the porpoise, which it pursues and preys upon.

\* TURSIO; High-finned Cachalot. This species is particularly distinguished by the great length and narrow form of its dorsal fin; the teeth are flat at the tip. This is said to be sometimes one hundred feet in length; at a distance the dorsal fin has the appearance of a mast of a ship. It inhabits the Northern ocean.

PHYSIC, or PHYSICK,  $\varphi\upsilon\sigma\iota\kappa\iota\varsigma$ , the art of healing, properly called *medicine*.

The word is formed from  $\varphi\upsilon\sigma\iota\varsigma$ , nature; because medicine consists principally in the observation of nature.

For the rise, progress, division, &c. of physick, see MEDICINE.

PHYSIC, *Hermetical*. See HERMETICAL.

PHYSIC, *Bachelor of*. See BACHELOR.

PHYSIC Nut, in *Botany*, the name of a species of the jatropa. See CASSADA.

PHYSICAL,  $\varphi\upsilon\sigma\iota\kappa\iota\kappa\iota\varsigma$ , something belonging to, or really existing in nature.

In this sense we say, a physical point, in opposition to a mathe-

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mathematical one, which last only exists in the imagination. Or a physical substance, or body, in opposition to spirit, or metaphysical substance, &c.

PHYSICAL or sensible horizon. See HORIZON.

PHYSICAL agent, cause, certitude, concrete, continuity, evidence, fate, good, liberty, necessity, part, perfection, possible, pre-determination, promotion, qualities, and quantity. See the several substantives.

PHYSICAL Education, is that branch of education which respects the care and culture of the bodily powers, considered in reference to their subserviency to the mental powers, and the influence of the state of them upon the mind. As we have already observed in EDUCATION, the organs of sensation must have vigour and sensibility, in order to bring the system of thought and feeling into its due state of perfection, both as to comprehensiveness and vigour, and as to proper direction: and much of intellectual improvement and moral culture depends upon the state of the muscular and nervous system in general. The education of the human being, as far as respects these objects, may be termed *physical*; and by physical education, therefore, we understand that series of means by which the external organs of the mind, the organs of sensation, and the muscular and nervous system, so far as the mind is directly concerned in their operations, are to be preserved in a sound and healthy state, and improved in activity and vigour.

When we consider the influence of the body on the mind in its greatest extent, we are fully aware that whatever affects the health and vigour of the body, may, with strict propriety, be regarded as an object of education; and in this point of view, the whole treatment of infancy, childhood, and youth, in respect to health, whether its continuance or restoration, might properly come under the head of physical education. But in the article above referred to, we expressed our intention not to encroach upon the science of pathology; it would lead us into a field by far too extensive for our limits, without affording any material aid in the object we have in view. The judicious mother may learn much from books on the diseases of infancy and childhood, which will operate by way of caution and prevention; but we strongly recommend her not in general to undertake herself the management of those diseases, but to obtain good medical advice. We do not doubt that the parent who has a tolerable acquaintance with the nature of the bodily constitution, and has had the advantage of much experience and observation, will often be the best physician for her children: but there are few who would not be benefited by the advice of others in all cases which may permanently affect the health; and, in general, by far the safest and best way is, early to call in that aid which medical skill may sometimes effectually afford, without tampering with the constitution by the use of powerful remedies, or even of common ones too frequently. Still, however, we are satisfied that the judicious mother may derive from books much important information respecting the medical treatment of her children, particularly in the early periods, and in the way of *prevention*; and we may be allowed, as we go along, to recommend one work which we have reason to believe of great value, *viz.* Underwood on the Diseases of Children. In mentioning this, we are at the same time aware that much that is valuable may be derived from Mofs, Hamilton, &c.

While we are referring, as we frequently have done in the preceding articles on this subject, to the mother's share in early education, we feel astonished that the most important objects of female education are so much neglected. Were they generally educated with a specific view to their afterwards filling some of the most important relations of

domestic life, the next race, or, at farthest, that which follows, would be, without example, wise and good. If such were the views adopted in education, it would then be a primary object to cultivate their *understandings*; to give them solidity, accuracy, and comprehensiveness of judgment; and to store their minds with that correct and important information, which would enable them, in their turn, to train up their own offspring, or the offspring of others, in that way which would give them the greatest probability of being vigorous, healthy, and active in their bodily powers, and lay the best foundation for intellectual and moral excellence. A woman may not be a wife or mother, but she can scarcely fail, if properly prepared for those relations, to be led, in some way or other, to fill situations in life, bearing considerable resemblance to them in their effects on the improvement and happiness of others.

In MORAL Education, col. 1—3, we have referred to the intimate connection which exists between the cultivation of the moral and intellectual powers. In fact, neither can be neglected without serious injury to both; though the influence of moral education upon the culture of the understanding, is decidedly the greatest and most extensive. Physical education, in like manner, bears a close connection with the other branches; and, indeed, it lies at the foundation of both. But it can seldom, if ever, be necessary to make it an object *altogether* independent of the culture of the mind; and if pursued solely in reference to the animal health and strength, there is no doubt that the seeds of their destruction will often be sown, by the very means which are employed to promote them. This is a truth which may, at first sight, appear rather paradoxical; but we leave it, with full confidence, to the consideration of the judicious observer, who will find it more particularly true with respect to boys. We are perfectly disposed to admit that the care of the bodily health should be a primary object in the early periods of education: and we are certain, that by making this, in a proper manner, a primary object, the ulterior ends of education will be best accomplished: but then it should be pursued with a view to those ends; and if it be not, it will itself, in all probability, defeat its own purpose. An unrestrained mind in a vigorous body cannot fail to be eventually a slave of the body. In subsequent periods of education, mental and moral culture may, and must be, the leading objects; but they too will, in a considerable degree, defeat their own ends, if pursued without reference to the bodily health and vigour. We would by no means intimate that debility of body, or extreme physical sensibility, is *necessarily* attended with ill effects on the moral and intellectual system. Under judicious management, they often have led to high degrees of moral worth, and have not prevented very great progress in mental culture; but their general tendency is, on the one hand, to produce debility of mind, and the moral qualities connected with it, cowardice, meanness, &c.; or, on the other, that extreme insensibility which will either speedily consume the powers of body and mind, or sink into selfishness of the most injurious kind, because it often wears the garb of benevolence.

Whatever be the nature of the immediate organs of the percipient principle, there can be no doubt that they depend greatly upon the bodily system. Whatever be the nature of the organisation upon which sensation, retention, association, memory, and imagination depend, it is indisputable, that it is most intimately connected with the material organisation which is connected with any of the operations of the mind. As far as the judgment depends on these subordinate powers, this also must be affected by whatever affects them. Taking the term in its widest sense, the  
memory

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memory is necessary to the judgment; it supplies it with its materials for discrimination, comparison, &c. so that without it there could be no exercise of judgment; and if there be a deficiency in the calls for this exercise, whatever "high capacious powers, lie folded up in man," however great the natural capabilities of the mind, they never can be properly and fully evolved. That the elementary powers forming the memory and imagination, are very greatly dependent upon the body, is a point so well ascertained, that we may assume it as a fundamental position; and the close connection, therefore, between the culture of the understanding and a sound and vigorous physical system follows at once as a necessary consequence.

We consider it as an established truth in mental science, that sensations are the rudiments of all our mental pleasures and pains, and also of all our intellectual ideas, except those immediately derived from consciousness. The reader of the article *Mental Philosophy* would perceive that we do not neglect the direct influence of the understanding in aiding, modifying, or restraining the operation of the associative power on the relics of sensation: but however great this influence, the above statement is no less true; and we think it an important truth. We have, however, already said enough on this fundamental position in the first division of *Intellectual Education*, and near the beginning of the second in *Moral Education* (see also *Mental Philosophy*, Div. II.): and we shall, therefore, only add here, that the business of physical education, as we have defined it, is, to keep not only what are generally known by the appellation of the external organs of sensation, but the whole muscular and nervous system, in a sound and vigorous state, or to bring it into that state, and this not only with a view to the health of the body, but also to the intellectual and moral welfare,—in other words, to the worth and happiness of the individual.

The capacity of sensation may, no doubt, depend upon the peculiarities of the mind itself, of the percipient principle (whatever that be); but without resorting to an opinion which probably can never be proved, we see enough in the diversities of the bodily organs of sensation, taken in all its varieties, to account for all the known diversities in *sensation*, (considered of course as distinct from perception); and we, therefore, do not hesitate in the belief, that this elementary principle of the mind depends upon the corporeal system. How far this is the case with respect to association, considered as distinct from sensation and retention, we have no certain means of ascertaining; but various facts lead to the belief that it is to a very great extent. The power of retention, there can be no doubt, depends greatly upon the state of the corporeal system; and, indeed, the statements of different writers respecting the influence of the bodily state on the memory, may be applied partly to the associative power, and partly to the power of retention. Altogether, however, there is no room for reasonable doubt, that the elementary powers of the mind, by which almost the whole of its furniture (of intellect and affection) is acquired, depend in their original operation upon the state of the physical system, and are modified by it through life. Indeed there are few who by the influence of external causes or of their own voluntary efforts, are able to cement that influence.

We are fully satisfied that there are decided original differences, not only in the powers of sensation, retention, and association, but even in the judgment; and probably the three former are, by their very nature, directly dependent upon original peculiarities of the physical organization, the varieties of which, if we may judge from external appear-

ances, are indefinitely great. But we see no reason to doubt that the defects or exuberances of all of them, may be considerably, though not entirely, corrected by direct or indirect culture; and that this must be done, in the first instance, by means of physical education. If there be an excessive degree of physical sensibility, the object must be to lessen it. In all probability, when the body is healthy, there seldom, if ever, is too little, as far as respects the mere capacity of pleasure and pain; but in reference to the acquisition of intellectual ideas, the organs of sensation often admit of great improvement in the power of receiving and conveying to the mind the rudiments of knowledge. However, the grand point is, if possible, to make and preserve the body sound and vigorous, in that state in which "life is felt in every limb:" presuming that the influence of this state upon the mental and moral powers, if accompanied with a proper attention to their culture, cannot be otherwise than beneficial; and that the contrary must often be highly prejudicial: directing the attention to the supply or correction of the influence of the body on the mind; and in all instances aiming to make the degree of muscular or nervous health possessed, as beneficial as possible in its effects on the internal furniture of intellect and affection.

Considering the mutual dependence of the body and the mind on each other, and (from the little which we have stated on the subject, and other circumstances which will readily occur to the intelligent reader) the intimate connection which exists between physical, and intellectual, and moral education, it will scarcely be expected that we shall be able to draw a minute line of distinction between these branches of our subject: indeed we shall find it less practicable here than in our former articles, (in which, however, greater minuteness than our plan admitted, would have brought their connection more forcibly into view); nor shall we attempt to preserve such distinction. Our leading object will be,—the education of the body; but as it should always be pursued with a view to its influence on the happiness, and on the development and culture of the intellectual and moral powers, we shall take it without any very nice discrimination, which in our apprehension would be wholly useless and impracticable. In several instances we shall be led to state considerations most closely affecting moral education, in consequence of their intimate connection with our immediate subject; but we doubt not that, in general, this will be seen to be predominant in almost every portion of this article.

The great point clearly is, to preserve, or to produce, that health and vigour of the bodily system in general, and that soundness and susceptibility of the organs of sensation, which powerfully contribute to intellectual and moral improvement, as well as to the happiness and usefulness of the individual.

We shall not find it necessary to enter very minutely into detail on the means by which these objects are to be effected. The education of the body, where there is no excess of refinement, or perversion of false philosophy,—where, in short, it is left to the guidance of good sense under the influence, not of parental anxiety but of parental care,—can seldom fail, in ordinary cases, if the basis of a good constitution previously exist, to go on successfully: and in extraordinary cases, it requires the aid of what we cannot attempt to supply,—medical skill. Much information, too, may be derived from books which are accessible to most parents; and as we are more desirous of making our pages the vehicle of useful truth, than of striking novelties, we shall freely avail ourselves of that information, where it appears to us just and important. In this object we have found a work, entitled "The Parent's Friend," of considerable service; and as we were not acquainted

quainted with it when drawing up our former articles, we wish now to introduce it to the notice of our readers. It consists of "extracts from the principal works on education, from the time of Montaigne to the present day (1802), methodized and arranged, with observations and notes by the editor." As the opinions adduced are sometimes in direct opposition to one another, and still more frequently in their connections and consequences, it may perplex those who are not accustomed to think and judge for themselves, but to those who are, it will afford many useful hints, and much valuable information; and by observing the variety of opinions on subjects, which, at first sight, may appear of obvious and easy decision, it will lead to more extensive examination, and leave the mind more free from the undue influence of authority, in a case in which the judgment alone should have the predominance. We shall be indebted also to that singular work, "The Light of Nature pursued," and though we know not how to give an indiscriminate recommendation of Dr. Beddoes's *Hygeia*, yet we cannot doubt that the judicious parent may derive from it, as we have done, many valuable observations, which may be of singular use in the work of physical education. In one division, Dr. Currie's Medical Reports will supply us with some very important observations. When we have made such use of any of these writers, as appears to require acknowledgement, we will specifically refer to them.—We will begin with the following quotation from Search, which will give the reader a specimen of the author's peculiar style (see *Mental Philology*, near the end of Div. I.), and at the same time convey some very useful principles in the conduct of this and other departments of education.

"It is very material whether this principle (parental affection) be left to operate at random, solely by its own impulses, or guided by judgment and discretion. If due consideration be had," children "will not be regarded merely as play-things for the parents to divert themselves with, or shew about among their friends and visitors, to remark how tall, how lusty, and how lively they are; but as an important charge committed to our hands, as our nearest neighbours, whose fortune in this world and the next depends upon our management; which, therefore, deserves to be esteemed a serious affair, and be made the object of our constant attention. For the constancy of the application is of more consequence than the vehemence of it; as a little negligence or indiscretion will overthrow the good effects of many cares. People are apt to be prodigiously anxious for their children by starts, just when it comes flung into their heads, and then think no more of them for long intervals afterwards. In their serious moods they collect treatises of education, in hopes to find a secret there for becoming excellent managers by the bare perusal; but these aids at most can only direct them, in some particulars, how to apply their industry, but can never infuse it: they must draw this principle from their own fund, and have gotten an habitual diligence, before they become qualified to reap any benefit from the observations suggested to them. *It is not a set of rules, how complete soever, but a steady vigilance and readiness to seize every opportunity of practising them, that must do the work.* Where there is the latter, it will go a great way towards supplying deficiencies in the former: for we see people, with very little knowledge or judgment, succeed well enough for common use, by an assiduous application of such judgment as they have; and there are more errors committed in the world through negligence than ignorance."

We fully agree with this singular writer, that the physical education of a child may be considered as commencing even

before its birth. How his moral welfare and happiness are affected by his being the offspring of an illicit connection, the reader may see well delineated in the *Light of Nature* pursued, if his observation do not furnish him with abundant proof. This we shall not extract or abridge, but will quote another passage, hearing more directly upon our immediate object. After having made some excellent observations on the duty of exercising prudence in forming the conjugal relation, and of giving some little consideration "what other parent we give our children, upon whom their future health of body and mind is to depend jointly with ourselves," he proceeds: "But happiness is made up of many ingredients, requiring forethought to provide for them; and if any principal ingredient be wanting, it will render all the rest of no avail: therefore, it is a cruelty, or at best an unpardonable negligence, when people entail diseases, diltemperature of brain, weakness, or poverty, upon their offspring, by unsuitable matches, or provide them with a parent who knows nothing but trifling dissipation and amusement, incapable of steadiness, or consideration, or of helping them either by instruction or example. This is sacrificing their children to their own fond fancy, or the glare of riches and splendour, whichever of the two idols happens to possess their imagination." He does not expect that every thing could be exactly according with our wishes, nor pretend to determine to what point precisely the interest of the parties is to give way to that of their probable offspring; but maintains that this ought not to be overlooked, as it so frequently is, especially by very young persons. "And if such weight has been given," he continues, "in making the connection, I presume it will not cease to operate afterwards during the time of gestation; but the mother will abstain from such intemperances, diversions, and hazards, as might prove hurtful to the burden she bears, preserving such a steadiness and sobriety of temper, as may secure her against frights and longings; and the father will strive to ward off whatever might excite any turbulent passions, or urge to any improper exercises, which would disturb the vegetation of the growing plant, or vitiate its juices." During the period of gestation, the mother ought, in the most careful manner, to avoid every thing which may produce bodily constraint, such particularly as tight and cumbersome dresses; all the productions of the tyrant fashion, which tend to impede the free development of the fœtus, as well as to render delivery more difficult. She should, for a similar reason, avoid every kind of agitating exercise, such as riding in carriages with rapidity on uneven roads, dancing, lifting or carrying heavy loads; in short, all fatiguing employments whatever.

Among the predisposing causes operating powerfully to check the processes of physical education, may be mentioned early marriages; where the mother, especially, is not arrived at that period of bodily vigour, which may give her offspring a common chance for health, nor her mind at that period of maturity which may enable her, with advantage, to discharge the duties of a wife and a mother. "Be silent for two years," is somewhere mentioned as the judicious advice of a young lady to her lover; and it would often be indeed for the happiness of the parties, as well as for the welfare of their families, if this were given, with the specific view above referred to. If affection would not stand such a trial, neither in all probability would it the trials of life.

In the remaining part of this article we shall endeavour to bring, what appears to us of chief consequence in physical education, under the following divisions:

I. *Air, Temperature, &c.*  
II. *Cleanliness, Bathing.*

III. *Clothing.*

- III. *Clothing.*
- IV. *Beds, Sleep.*
- V. *Bodily Shape.*
- VI. *Diet, &c. Temperance.*
- VII. *Muscular Exercise.*
- VIII. *Exercise of the Senses.*
- IX. *Sensibility.*
- X. *Purity.*

I. *Air, Temperature, &c.*—Almost every one now knows, that the atmospheric air consists principally of two parts, one of which, oxygen, is essential to the support of life; that if this were in too great abundance, life would be spent too fast; but, on the other hand, that when there is not a sufficient quantity, (when, for instance, it has been consumed by flame, or by respiration,) the animal system cannot derive, from the portion of the atmosphere which is inhaled, that supply which is requisite to preserve it in a healthy state. In close rooms, where there is a fire, and perhaps several candles, and many persons at the same time consuming the oxygen of the atmosphere, there cannot be a sufficient quantity for the proper supply of each. If the external air is introduced in any considerable quantity into such rooms, unless due means are taken to prevent its proceeding in a current, the effect is usually highly injurious, by the rapid subtraction of heat from the persons who are within the current. In rooms which not only are not properly ventilated, but are also exposed to noxious vapours of any kind, it is impossible that health should be preserved or regained. One kind of air, (carbonic acid gas, or fixed air,) which is produced in great quantity by the burning of charcoal, is directly destructive; and if ever charcoal or coak are employed in rooms where there are children, though it would be better to avoid it in every case, it should not be without the utmost precaution, as the carbonic acid produced, if there be not a free circulation of air, will be in the highest degree deleterious, and probably fatal. Carbonic acid is produced by the burning of candles, and by respiration; so that by this means not only that part of the air is diminished, which is necessary for the support of life, but also another substance is added, which renders it more and more unfit for its object. These things are perhaps too little attended to, even by the well informed; by the ignorant they are altogether neglected. About nine or ten years ago, it was perceived that a lime-kiln, near one of the public medical institutions in Liverpool, (the infirmary, we believe,) was a cause of great inconvenience to the patients, whenever the wind brought the air from it towards the wards. As lime is employed, with so much advantage, for the promotion of health and cleanliness, it was thought a mere philosophical whim to suppose that the lime-kiln could be injurious. It was, however, prosecuted as a nuisance; and at the Lancaster assizes; the jury were convinced that it was so, by the intelligible, though philosophical, representations of Dr. Currie,—a man who united in a rare degree the talents for profound research, accurate investigation, and forcible, yet perspicuous, and even elegant expression; and whose name will long continue to stand high in the annals of philanthropy and medical philosophy. The well-known fact is, that when the lime-stone is being burnt, carbonic acid gas is expelled from it in great quantities, so as to diminish its weight nearly half; and it was this air which proved so unpleasant and injurious to the patients: on the other hand, the strong tendency of quick-lime to absorb carbonic acid from the atmosphere, is one principal cause of its salutary effects. One more circumstance we must mention in this connection, that carbonic acid gas, being considerably heavier than atmospheric air,

will, where it exists in any large quantity, sink to the bottom of the room; and on this account, the beds of children should not be placed on the floor. On the other hand, as heated air and (as it appears) noxious effluvia are lighter than pure air at a lower temperature, the most wholesome air will be found somewhat below the middle between the floor and the ceiling. It is from the effect of heat upon the gravity of the air, that a fire, with a moderately open chimney, is productive of very valuable effect in producing a considerable circulation of the air, and carrying off that which has been already deprived of its oxygen. There can be no doubt, that a room warmed with a close stove, other things being the same, cannot be so healthy as one with an open chimney; and it is, therefore, probable that the recently introduced register-grates, where the opening is but just sufficient to receive the smoke, will have no beneficial effect upon the health, though they may be more economical of fuel. In rooms for children, the due medium should be observed; but the wider the chimney the better, so long as it does not cause currents of cold air in the room.

This should be carefully avoided, especially in the room designed for the habitation of an infant. Violent inflammatory complaints are often produced by inattention to this circumstance. Among the poor a breach in the window, or a fissure in the wall, opposite the spot where the infant is usually held, have been attended with serious consequences of this nature; and the same thing has occurred in opulent families, by the shrinking of the sash frame or a board in the floor, or of some other wood work, which has admitted a strong but unperceived current. “The fire-place should be contrived that even in cold weather a steady temperature of about 60° may be kept for the first four or five weeks after birth. The air of the nursery should not be suffered to be below 50°.” The heat should be regulated by a thermometer. If the use of such an instrument be not thought superfluous in a hot-house, for the purpose of securing the well-being of an exotic plant, it should not be thought unnecessary for the regulation of the temperature in which a little being is to be situated; equally tender with an exotic plant, arrived from as warm a climate. Few fathers, when once convinced of the propriety of a *steady mild* temperature, will hesitate to dedicate their most suitable apartment to the health of their offspring. Small nurseries cause many complaints, and many bad constitutions. If the door is kept partly open for the purpose of admitting air, the current is great and injurious; and a fire somewhat too brisk, produces a degree of heat which will aggravate some diseases, and greatly enervate a habit constantly immersed in it. (Beddoes, *Ess. v.*) Here, and in some other instances, in abridging from Dr. Beddoes, we have availed ourselves of the abstract in Dr. Stock’s valuable *Life of Beddoes*.

The motion given to infants should at first be gentle, on account of the extreme susceptibility of the membrane which lines their nostrils and air-passages, (the mucous membrane.) It produces a considerable irritation which keeps up the susceptibility of the membrane; and this sometimes lays the foundation of asthma at a very early age, and more frequently a propensity to colds. The use of the cool bath at first, and afterwards of a cold one, is the safest and most effectual method of diminishing this extreme susceptibility, and of habituating the whole body to variations of temperature. For a new-born infant Dr. Beddoes prefers immersing up to the neck in water at 88°. “In a week the temperature may be reduced to 75°, and progressively to 60°, at which point we may stop for a twelvemonth.” The severe discipline of washing in spring

## PHYSICAL EDUCATION.

water, of the natural temperature, should only be gradually resorted to, and never until the strength of the infant is sufficient to resist its chilling influence. When the skin is in a hot and dry state, the body may then be bathed with advantage in tepid water; or the child should be taken into a room without a fire, and gently carried about till it returns to its natural temperature. This, when there is no feverish disease, will soon happen. The same plan should be pursued when it is hot, restless, or uneasy at night, for which purpose it should be taken out of bed. On the other hand, when the extremities are cold and clammy, gentle friction before a moderate fire with the hand, or with a soft flesh brush, is recommended, with the internal use of small quantities of thin animal broth, a little above blood heat. To this, immersion in a warm bath at 96° may be added, and repeated, if occasion require, four or five times in the day. Beddoes.

In cold seasons, the removal of children into the open air should not be precipitated. It is better to be content with habituating them to those variations of temperature which different rooms in the same house will at first supply. They should not at first be carried into the cooler room, except when they are rather warm, and then only for a short time. Where likely to be met by streams of air, the whole head should be covered, allowing sufficient breathing room. They should be rendered hardy, by exposure to a cold calm atmosphere, for a short time at first, and at no time till they are chilled. They should never encounter rude blasts till they can move briskly enough to produce warmth from within, and then only at intervals successively prolonged. "The parents who feel a just confidence in the robustness of their offspring, will do no injury by proceeding with a measured pace. We have access to no river Styx, in which one immersion shall render us invulnerable to the elements." The superiority of those who have been accustomed to face the several variations of temperature, to the "inactive fire-side tenderling" in vigour and health, would naturally enough lead to the supposition,—that to endue a young person with these desirable qualities, nothing more was necessary than to expose him sufficiently to the cold. From this prejudice many constitutions have sustained irreparable injury. The true principle is, *gradually to inure the habit to cold*; and a good constitution may thus be enabled to bear severe and long continued cold without detriment: but *as soon as a chill comes on, the process should be suspended*; for in the strongest constitution, "long continued and repeated chills will, in the first instance, enfeeble, and, in the second, bring on a susceptibility to the operation of the powers that superinduce violent diseases." Beddoes.

One great source of injury from diminished temperature, is to be found in the custom of bathing or swimming, when too long protracted: but some remarks on this head will come more properly under the next division.

A grand cause preventing that invaluable state of the bodily system, which we will term hardiness, is the dependence placed upon external warmth for producing a comfortable state of sensation. It is a fact incontestibly proved that the continued application of external warmth renders the living system less capable of being called into strong, healthy, or pleasurable action. Every muscle steeped in a heated medium, loses of its contractility: every nerve grows languid; and when excited, acquires a disposition to throw the moving fibres with which it is connected into convulsive movements. Instead of accustoming our children therefore to heated apartments, from which every breath of air is excluded, we should lead them to seek for warmth

by exercise, or provide them with it by that kind and degree of clothing which will confine the animal heat, and thus in reality encrease it. Beddoes.

Till hardiness has been acquired, and perhaps even after, sudden variations of temperature can scarcely fail to be attended with injurious effects upon the bodily system. This is the chief cause of colds, or catarrh. The inflammatory species of catarrh are not simply owing to cold, but arise from the concurrent or successive action of cold and heat, or of stimuli equivalent to heat. If the cold to which the system has been exposed was considerable, heated apartments and warm spirituous liquors concur in carrying inflammation to its just height. It is well known that frozen limbs will inflame so as to mortify, if they be not carefully kept from the contact of mediums which are considerably above the freezing point; and the remedy is to rub them with snow. When the mucous membrane has been chilled by frosty air, it is reasonable that a similar method should be adopted,—gentle exercise in an atmosphere not much exceeding the temperature by which it has been chilled, and the avoiding for the day all kinds of heating liquids. Beddoes.

The beneficial effects arising from the exposure of the bodily system to the external air, separate from those arising from exercise, are, in the first place, supplying it with air containing a due proportion of oxygen, which can seldom be obtained in rooms constantly inhabited by several persons unless thoroughly and frequently ventilated; and next, taking away a portion of the superfluous heat from the body. Hence, though exercise within doors is much better than no exercise at all, yet the bracing invigorating effects of the external air can seldom be thus obtained, and indeed never, except in a cool room kept well ventilated. When children, therefore, have sufficiently gone through the hardening process to bear it, they cannot be too much in the external air, as long as they are free from chilliness. The dry cold easterly and north-easterly winds, and the dampness so frequently in our climate, on the one hand, and the excessive heats of summer on the other, should certainly excite the parent's caution; but when the air has sufficient coolness in summer, and is sufficiently dry in the other parts of the year, almost continual exposure to it, with the above precaution, cannot fail to be beneficial to the constitution properly prepared for it. As the requisition of physical health should be the chief object of the first period of education, the parent should embrace every opportunity of giving his children the full benefit of this means of health.

Regularity in mental employments is of very great importance, and the habit should be early formed, but the requisite arrangements should be so contrived, as to interfere as little as possible with this most essential point.

It is a well-known and important principle of chemical philosophy, that solids when changing into fluids, and fluids when changing into vapour, absorb heat. And where this is not supplied with sufficient rapidity by the immediate cause of the fluidity or evaporation, the substance undergoing the change abstracts heat from all the surrounding substances, in other words produces a greater degree of cold. It is on this account that, though the atmosphere may be warm during a thaw, the body, when near the melting substance, generally feels chill; and that the same effect is experienced in damp weather, since the heat of the body produces a degree of evaporation from the damp on its surface; and the same effect is produced in a greater degree, and often without being immediately experienced, when wet clothes (the shoes and stockings for instance) are rapidly dried whilst they are worn, and at the same time the body not supplied

plied with natural heat by exercise of any kind. Indeed there are few constitutions, unless they have gone through the processes of hardening to an uncommon degree, which can avoid being injured by this common practice. The intense degree of cold produced by evaporation, may be perceived by pumping on the hand, so as to have only an occasional stream of water upon it in different parts: if the hand were kept still in water at the same temperature, much less cold would be experienced. In like manner, if the lower extremities be placed in warm water, and the water be gently agitated, so as to expose part of the wet surface of the leg to evaporation, this part will be found very cold, while the rest is very warm. Those who are much accustomed to observe their sensations, may perceive that even when the water is still, if there be sufficient warmth to produce evaporation, the part of the leg immediately above that which is immersed, feels colder than the rest, nearly as though there were a ring of metal round it. Perhaps, however, the effect may be most completely perceived, by first standing a little before a quick fire, and then suspending close before one a piece of damp flannel; if sufficiently near, and the heat sufficiently strong to produce a rapid evaporation, the cold produced (in other words the loss of heat) will be very sensibly felt, and might be made evident by the employment of a thermometer.

By attention to this principle, parents will take care, if their children's clothes are wet, that they either keep in some degree of exercise till they are dry, or have them removed; that their skin is well dried after washing or bathing; that their linen is properly aired (not warmed, except for weakly children) before it is put on; and that no clothes should be put to dry in the room in which they live. Inattention to this last circumstance, in the nursery particularly, is a common cause of chill and colds among infants. When we consider, however, how little injury is experienced by alternations of heat and cold in the hands, or by their exposure to damp, how little, too, where the feet are continually exposed to them without the protection of shoes and stockings, and how frequent the circumstances in real life where some considerable exposure must be experienced; it is clear that caution should not be carried too far; the only point is that the hardening system be introduced by degrees, and that those degrees be determined by the previous state of the system, *i. e.* its capacity to endure them. To attempt to carry them on with a weakly child, as rapidly as with a healthy one, would be foolhardiness.

We referred in a preceding paragraph to the injurious influence of the easterly and north-easterly winds in spring. These are not only cold, but extremely dry; and by their dryness alone they must act as powerful refrigerants on moist surfaces. Their effect in producing this diminution of heat is proved by the following observations of the late accurate and ingenious Dr. James Hutton of Edinburgh. "I used to amuse myself in walking in the fields, by observing the temperature of the air with the thermometer, and trying its dryness by the evaporation of water. The method I pursued was this: I had a thermometer, included within a glass tube, hermetically sealed; this I held, in a proper situation, until it acquired the temperature of the atmosphere; and then I dipped it into a little water, also cooled to the same temperature. I then exposed my thermometer, with its glass case thus wetted, to the evaporation of the atmosphere, by holding the ball of the thermometer, or end of the tube, in which the ball was inclosed, towards the current of the air, and I examined how much the evaporation from that glass tube cooled the ball of the thermometer which was included. During the summer season, in the driest weather that I

could find, I never sunk the thermometer in that manner, to the best of my remembrance, above two, three, or four degrees. But in a cold east wind in the spring, I once sunk it between nine and ten degrees. It was, I believe, about the month of March or April; the sky was cloudy above, and no sunshine, and the wind was cold to the feeling, steady blowing, but not strong." Hence we perceive, that the superior dryness of the air in March makes moisture evaporate faster than the superior heat of the summer air: and this is independently of all sunshine. It is evident the surfaces along which the dry cold air passes in breathing, must be affected in the same manner as the surface of the wetted glass tube; and these surfaces thus cooled, will be ready to be thrown into intense action by the rays of a powerful sun in a sheltered spot, or beside a brisk fire at home. Beddoes.

If circumstances require exposure to the external air in such circumstances, before the general system is properly hardened, a simple expedient which Dr. Beddoes recommends to adults, where there is a disposition to catarrh, may be employed with great advantage; *viz.* to place a sufficient number of folds of gauze or muslin over the mouth and nose; it will not only warm the air before it enters the respiratory passages, but likewise give it moisture when the air is dry as well as cold. There are probably few travellers who have not experienced the beneficial effects produced by fastening their comforters over the lower half of the face.

II. *Cleanliness, Bathing.*—We persuade ourselves that it cannot be requisite, in the present day, to urge upon parents the necessity of the strictest attention to the cleanliness of their children. The old maxim, "cleanliness is next to godliness," has a degree of truth, in a moral as well as physical point of view, which it may require some experience in life to perceive, but which observation will completely prove to all who will not absolutely close their eyes to what passes without them. A want of cleanliness is almost universally united with carelessness and indolence. It renders the body susceptible of infection, while the contrary practice affords the greatest security against virulent diseases. There can be no reasonable doubt that cleanliness is one grand cause why the rich escape so much more than the poor from infectious fevers; and that their prevalence and virulence among the poor, are, in a great measure, to be attributed to the want of it in their persons and in their dwellings, &c. Personal cleanliness, and cleanliness in the apartments in which children live, should be most strictly enforced; and such a regular system should be early adopted, as may secure this most desirable end. No day should pass, except when the bodily health is materially interrupted, without a complete washing, not only of the extremities, but of every part of the body; and if this cannot safely be done with cold water, it is extremely seldom that it may not with cool or tepid water. Children should be early accustomed to wash themselves, but it should be under careful inspection till they have completely formed the habit of doing it thoroughly; and when this is done, it will be as unpleasant to them to omit it, as to some it appears to be to make themselves clean. When past the early periods of childhood, it will often be impracticable to carry on the system of universal washing; but it should be made as general as possible, and for the purpose of cleanliness, as well as of invigoration, the bath should be employed as frequently as domestic circumstances, or the state of the constitution will allow: with respect to the former, by suitable management they might generally be made to bend to the latter.

Bathing certainly ought to be regarded as having a powerful efficacy on the system; and if its effects appear to

be injurious, before it is much persevered in, medical advice should be obtained. The advocates for *tepid* bathing seem to have great reason to recommend it as a valuable remedy, or even as a preservative in cases where the constitution is weakly, and has consumptive tendencies; but the facts which they adduce, rather prove it, we apprehend, to have a stimulating and relaxing influence, than an invigorating efficacy; and the warm bath at least should seldom be employed, except by medical direction, in reference to the particular case. As our present object is not the recovery of health, but the invigoration of a system which is at least tolerably free from direct tendencies to disease, we will leave the subject of warm bathing to the physician. No doubt cold also requires caution. Where the constitution has any direct phthisical tendencies, or is peculiarly weakly, it would be rash to expose a child to it; but we cannot doubt that in other cases, cold, or at least cool, bathing, employed with precaution, and in that way which experience may shew to have the most beneficial effects upon the system, has a highly important effect in giving strength and activity, or in keeping up the tone and vigour of those who are already robust.

If the *cold* bath is employed, the system should be *gradually* brought to the capacity of bearing it. There are exceptions to the necessity of this rule: and amongst the ancient Germans, (as at present among the Russians,) immersion in cold water was employed in the earliest periods of infancy: those who survived the experiment were without doubt rendered more hardy by it; but in all probability, numbers sunk under it. It is an experiment which no parent ought to try, without a well-grounded confidence in the strength of his child's constitution; and as the same effects may be *safely* produced in a more gradual way, it seems to us a risk which few circumstances can justify.

We strongly recommend to the intelligent parent, the perusal of Dr. Currie's Medical Reports "on the effects of water, cold and warm, as a remedy in fever, and other diseases, whether applied to the surface of the body, or used internally." It is a work which can scarcely fail to afford a warm interest to any one accustomed to accurate observations and scientific researches. The 15th chapter, containing "an account of the remarkable effects of a shipwreck on the mariners, with experiments and observations on the influence of immersion in fresh and salt water, hot and cold, on the powers of the living body," must be regarded as a fine specimen of philosophical investigation; and a young person, properly prepared for it by previous information, would find it a highly useful study. We recommend this work to the parent, because he will find in it some highly important principles respecting the effect of water upon the animal system, which may be applied with great advantage in a state of health, and which, in those emergencies which sometimes occur in sickness, may be the means of preserving life in his family, or among his neighbours. To enable a person to employ these principles in cases of illness, he must study some parts of the work itself (see *BATHING*); but we shall select those which will prove of immediate importance in physical education. It is to be observed that Dr. Currie applies the term *tepid* to water heated to that degree which is warm, but not hot to the sensations, which, in the way of *affusion*, is from 87° to 97°. When the body is *immersed*, it may be applied to water some degrees higher. (Vol. i. p. 69.) "By the term *cool*," he afterwards says, p. 75, "I indicate from 87° to 75°;" and as this obviously refers to affusion, we may suppose that *cool* in *immersion* extends from about 82° to about 70°: but as far as the sensations are concerned, there is no doubt that great variation will be experienced from the comparative temperature of the air, and its bracing

effects on the system. The writer of this article recollects finding freezing water produce a sensation of comparative warmth, while immersed for a short time in it; and in the employment of a shower bath, in the winter months, has generally *felt* the water to be warmer in a cold frosty morning, than in a mild damp atmosphere, when the water itself must have been of considerable higher temperature. 1. The principle which Dr. Currie lays down respecting the use of the *affusion* or *affusion* of cold water, in fever, will afford a good direction respecting the use of cool or cold bathing generally. It may be safely used, "*when there is no sense of chilliness present*, when the heat of the surface is steadily above what is natural, and *when there is no general or profuse sensible perspiration*." (P. 17.) For our purpose, the second clause may be changed into—"when the heat of the surface is not lower than what is natural," and the whole will then form an excellent aphorism. 2. The following statement appears to us, from repeated experience and observation, to convey the precise effects of cold bathing, where judiciously conducted. After having expressed his opinion (p. 70.), that in some cases the heat is lowered more speedily by the affusion of tepid than of cold water, Dr. Currie adds: "the evaporation from the surface is more copious from the tepid affusion; and on this the cooling of the body very much depends. But this is not all. The tepid affusion is little, if at all, stimulating, and does not, like the cold affusion, rouse the system to these actions by which heat is evolved, and the effects of external cold are resisted." It is on this principle that Dr. Currie considers the tepid affusions as a valuable remedy, in a great part of the feverish affections of children. 3. Speaking of the effects of spunging or wetting the body with cold or warm vinegar or water (p. 73.), he says: "According to my experience, it is not only less effectual, but in many cases less safe; for the system will often bear a sudden, a general, and a stimulating application of cold, when it shrinks from its slow and successive application." On this principle, which, we are fatigued from various considerations, is fully applicable to cool or cold bathing, we hesitate not to recommend immediate immersion, either by plunging in entirely, which, with care, can seldom be injurious, or getting in deep at once, and speedily covering the head with water; or, if the shower bath is employed, that the holes should be so large as to allow the water to come through rapidly. Experience will shew that this last precaution is of considerable importance. If the holes are small, the sensation is itself unpleasant and continued, and the partial evaporation often produces chilliness. When this is the case, bathing never can be beneficial. 4. The cool affusion "operates as a gentle stimulant, and may be used as a milder form of the cold affusion. Like the cold affusion, its application should be sudden and momentary, when the object is to increase the tone of the system, or to dissolve a morbid catenation. When it is employed to moderate inordinate heat, it may be used more slowly, provided it does not interrupt the catenation on which respiration depends." (P. 76.) We are not forgetful of the difference between the diseased and the healthy state of the body; but we see every reason to believe that this, and similar cautions, are applicable to both. 5. "The pernicious effects of cold water applied internally and externally, during profuse perspiration, depend upon the same causes, viz. that perspiration itself is a cooling process, under which, when profuse, the heat of the body, whatever its natural state may be, is sinking; that under such circumstances, we find, as a matter of fact, that it parts with its remaining heat more easily; and on the sudden application of cold, that this heat sinks to a degree which

which disturbs, and sometimes wholly interrupts the actions on which life immediately depends." The 12th chapter is one which cannot fail to be very interesting to the general reader. It is entitled "Of the disease that arises from drinking cold liquids, or using the cold bath after severe exercise;" and contains many remarks, which the classical student will find of advantage to him in his researches. Into these we must not enter, but confine ourselves to our present object; including, however, some positions more immediately respecting the use of cold water internally. The general fact is, 6. That the fatal effects proceeding from drinking cold water, in cases where the system has been extremely heated by bodily exertion, have occurred in circumstances, "where the system, after having been much heated and enfeebled by severe exertion, is losing its preternatural heat from profuse sweating, and in general also from the cessation of the exertions, by which this heat was originally produced. Here two powerful causes combine to cool the body; and if, under their operation, a sudden application of cold is made either to the stomach or the surface, the living power will, we know, resist it faintly, and the fatal consequences be accounted for." Dr. Currie then gives a number of cases, which should be read by the parent to his children, as soon as they are capable of fully understanding them, and afterwards brought back to their memory, as circumstances direct; and the same by the tutor to his pupils. And the parent and preceptor should be acquainted with one simple remedy, which, in cases where the injury has not been too great, may prove effectual in restoring vital heat, namely, "the application of a bladder filled with water, heated to 110° or 115°, to the pit of the stomach." 7. "There is no situation in which the application of cold to the body, whether to the surface or the stomach, is so safe, or in general so salutary, as when the heat of the body, from whatever cause, is preternaturally great; provided that the body is not already in a state in which it is rapidly parting with this heat, and no disease has taken place in the general sensibility, or in the structure of any of the parts; and that when the body is preternaturally heated, the degree to which cold water may be drunk may be always decided by the steadiness of the sensation of heat, and the tenacity with which the preternatural heat is actually retained. With this observation, however, must be connected another, "that the heat preternaturally accumulated by exercise is held with less tenacity than even the heat in intermittents. It is dissipated by the perspiration that exercise occasions; and is speedily lost, when to profuse perspiration is added a state of rest. It is then that a large draught of cold liquid is especially dangerous. But while the preternatural heat is sustained by continued exertion, cold liquids may be taken *in moderate quantities*, without producing any injurious effects. They may even, I apprehend, be drunk copiously, without producing suddenly the fatal effects already described: but in copious draughts, they are found oppressive to the stomach during exercise, and excite languor, nausea, and sometimes vomiting." Dr. Currie afterwards explains the difference between the influence of water taken into the stomach and used externally; which arises, he observes, partly from the weight and bulk of the fluid, particularly oppressive under the constant action and agitation of the voluntary muscles, and partly from the evaporation from the surface being promoted by the immediate access of external air. To these must be added another simple consideration, that where the external application is voluntary, it may be much more readily removed, and its injury checked, than where it is taken into the stomach; and this is of obvious import-

ance. "With these exceptions," he adds, "the operation of cold liquids on the stomach, and on the surface of the body, are analogous in the case of preternatural heat produced by bodily exertion, as in all other cases of preternatural heat. As it is safe to drink cold water, in proportion as the heat from exercise is great and steady; so also is it safe, according to this ratio, to pour it on the surface, or to immerse the body in the cold bath." 8. "In the earlier stages of exercise, before profuse perspiration has dissipated the heat, and fatigue debilitated the living power, nothing is more safe, according to my experience, than the cold bath. This is so true, that I have for some years constantly directed infirm persons to use such a degree of exercise before immersion, as may produce some increased action of the vascular system, with some increase of heat; and thus secure a force of re-action under the shock, which otherwise might not always take place. The popular opinion, that it is safest to go perfectly cool into the water, is founded on erroneous notions, and is sometimes productive of injurious consequences. Thus, persons heated, and beginning to sweat, often think it necessary to wait on the edge of the bath till they are perfectly cooled; and then plunging into the water, feel a sudden chilliness that is alarming and dangerous. In such cases, the injury is generally imputed to going into the water too warm; whereas in truth it arises from going in too cold. But though it be perfectly safe to go into the cold bath in the earlier stages of exercise, nothing is more dangerous than the practice, after exercise has produced profuse sweating, and terminated in languor and fatigue: because, as has already been repeated more than once, in such circumstances, the heat is not only sinking rapidly, but the system parts more easily with the portion that remains."

From the preceding observations it is obvious, that the cold bath should only be employed where the system has strength to stand the shock; and then its effects can scarcely fail to be beneficial, in invigorating the system, and preparing it to resist the influence of external cold. We recollect the case of a youth, of about 17, by no means of robust habit, and very liable to colds, who never was so little subject to them as during the winter, in which he persevered in the use of a cold spring water bath every other day. A walk of about half a mile to the bath prepared him for it: he undressed as quickly as possible, plunged once into the bath, and when well rubbed and quickly dressed, on his walk home, he had the most pleasing sensations of vigour and activity. As the system should be properly prepared for the excitement of cold bathing, we deem it an important precaution, at least for weakly children, not to employ it fasting. After a full meal, it can seldom fail to be injurious; but no time can be better than an hour or two after an early moderate breakfast. If this cannot be made convenient, a partial breakfast may answer the purpose. We observe this caution of experience given also by other writers on the subject. "I see no sense," says Dr. Beddoes, "in the common notion, that it is best to bathe with an empty stomach. I would not recommend the cool bath to a person full gorged; but it is desirable that the stomach should be in a state of gentle activity, as well as the external surface of the body."

Till the system has acquired considerable vigour, the cold bath should be employed solely with a view to its effects. Children, if the commencement of it is managed with caution, so as not to excite terror, will soon learn to like it, and would willingly stay in it. In summer, when the water has been exposed to the air, so as to acquire its temperature, this may be allowed, but rather sparingly. When boys learn

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learn to swim, unless the water be too cold, the exercise they take in it will considerably check its injurious effects; but there can be little doubt that the practice, so common among boys, of going very frequently into the water, (two or three times in the day, for instance,) and staying there a long time, especially if not constantly employed there in active exertion, has ruined many a constitution. Till young persons have learnt that it is a part of duty, as well as prudence, to take care of their health, and have acquired the requisite information to prevent injury, bathing should never be practised except under the eye of some judicious friend. The morning is, on various accounts, the best time for this exercise, as well as for bathing in general; and more particularly because the system is not likely to have been exhausted by exertion and profuse heat, and will be able, by activity in the water, to keep off chilliness. After the first approach of this, no person ought to stay an instant in the water.

The temperature of the water must be an object of considerable attention and caution, before robust health has been obtained. No one can be ignorant that water from a slow flowing river, from the rapid shaded torrent, from an exposed cistern, or from the well or spring, differs very greatly in temperature; and upon the principle, which should not be lost sight of, of hardening the system by degrees, the parent will not begin with water at the lowest temperature, or near it, but go on gradually through different stages of temperature, carefully observing the effects of each, and varying from it accordingly. No precise rules probably can be laid down for this purpose; but what has been already said may serve for principles to guide the judicious.

The difficulty of domestic bathing, except for the very young, has often probably prevented the employment of it. We are fully satisfied that the shower-bath, which every one may have in some form or other judiciously employed, will not only answer the leading objects as well as immersion, but in several respects better. The principal cautions in the use of it, respecting the temperature, &c. of the body and of the water, are the same as those for bathing in its more common form. In addition to these, we recommend that the child stand upon woollen, at least not upon the metallic lining of the drawer, or the wet boards; that the height from which the water comes be not very great, in general cases perhaps a few inches is best; that it is so contrived that the water shall come freely and rapidly, when once the course is begun; and that the quantity be not very great. We perceive no advantage, in common cases, for more than a complete affusion. We are so fully impressed with the importance of this method of bathing, that we shall just give a plan for the most convenient kind of shower-bath. The height may be as great as the room will allow, for the purpose of filling, (say  $6\frac{1}{2}$  or 7 feet.) The frame should consist of four stout pieces of wood, (say 3 inches by  $1\frac{1}{2}$ .) so connected that their outside edges may stand about 32 inches from each other at the floor, and 20 inches at the top. From about 10 or 12 inches from the floor, the bottom of the bath should begin to slope downward from each of the four sides, so as to form a square funnel, to convey the water into a broad, but shallow tub below. The funnel must of course terminate sufficiently far from the ground, to admit of the tub being easily removed. About two or three inches from the top of the funnel, some bars of wood should be placed across, on which a small board may be fastened for the bather to stand. The sides and door may be wood or canvas. The former is decidedly preferable; and a clever workman, in making it, will take care to have as

few obstacles as possible to the wet draining into the funnel, and that the joints are well made. We know of no better contrivance than the common top, a tin cylinder moving in a box, pierced with large holes at the bottom, about half an inch in diameter: this, however, need not be nearly so large as it is sometimes made. If the cylinder hold three gallons, it must in general be abundantly sufficient. A grown-up person can scarcely require more than two gallons, and a child of seven or eight not above two or three quarts. But the principal point is, that this top should be so contrived as to rise and fall within the case, for the purpose of adapting it to the height of the bather, and also for the convenience of filling it. Our experience leads us to conclude, that the use of shower bathing is much prevented by the difficulty of filling it, the want of care in its construction, the injudicious use of it, as to quantity, temperature, &c. and the damp chilliness of the place where it is usually kept; and we regret it, because, where the advantages of an immersing bath cannot be obtained, the shower-bath can seldom fail to be a most useful substitute, and often is decidedly preferable.

As to the comparative effects of fresh and salt water at the same temperature, we see reason to believe that the former operates simply by calling into action the animal powers of evolving heat, and by invigorating the surface: the latter has a decidedly stimulating effect, by its influence on the external vascular system. Sea-bathing has been often found to have a debilitating effect, where fresh water, at least in the shower-bath, has proved very bracing. Where the constitution is strong, there needs little attention to this difference; but among weakly children, sea-bathing should be regarded more than it is, — in the light of a medicine.

We have enlarged upon this point far beyond our intentions; but it appears to us of very great importance; and constitutes a very essential part of physical education. Some of the other divisions will admit of much greater brevity.

III. *Clothing.*—In our variable climate, considerable attention must be paid to the nature and degree of clothing, till a sufficient degree of hardness has been acquired to render such care almost unnecessary; it never can be altogether unnecessary, as long as the present habits of social intercourse are preserved, and as long as persons are subject to the debilitating influence of close heated rooms. But our observations chiefly respect the previous state, in which the system is going through the invigorating process, and among those classes of society where constant exertion in the open air is not employed. Exercise in the open air is undoubtedly the best means of producing animal heat, and next to that active employment within doors: but as this cannot be constantly going forwards, and continued, frequent, or great chilliness should be cautiously avoided, the clothing should be so contrived, particularly about the lower extremities, as to prevent the internal heat from passing off to the colder air. Preserving the internal heat by non-conducting clothing, such especially as woollen substances, is a much better preservative from chill, than the application of external heat. The temperature of the room in which children spend their time, should, if possible, seldom exceed  $50^{\circ}$  or  $55^{\circ}$ . It should be airy, dry, easily ventilated, especially at the top, but free from currents of air, and in order to procure warmth in cold or damp weather, sedentary employments should be continually mixed with exercise in which the extremities are employed. As it really is more difficult to provide exercise for the feet, and they are less employed in the usual occupations of education, it is desirable that they should not only be dry but well clothed; and

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except in summer, we can see no reason why warm woollen or even woollen stockings should not be used instead of the cotton clothing too frequently prevalent. If the feet are kept warm, the body will be usually found to take care of itself. Of course this and every other remark must be employed with judgment; but we are satisfied from observation and experience that it is the grand point. There can be little doubt that the general prevalence of slight dresses in winter, together with the absurd changes which are too often practised from warm garments in the morning to slight clothing in the evening and heated apartments, constitute one grand cause of the unhealthiness of that class of the female sex, who, unhappily for themselves, live in the walks of fashion. The general principle should be, to accommodate the dress somewhat to the season. Hardiness should be sought, rather by exercise, air, general attention to temperature, &c. than by sparing clothing. When it is acquired let experiments be tried; till then, parents will do well to give their children such clothing as, without being heavy, cumbersome, or heating, may prevent chilliness, both when engaged in domestic and even sedentary occupations, and when exposed to a cold atmosphere without. As to the employment of flannel under the linen, we think it of great service where there is a considerable tendency to chilliness and even to perspiration, provided it does not increase that tendency. But it should be as thin as possible; it should be frequently changed, and accompanied with a constant attention to the invigorating systems. And certainly it is not so desirable to begin a habit so difficult to break without judicious medical advice. Whatever additional clothing is employed for winter should be left off with caution, and not till the mild weather of spring, (if such there be in our climate,) is fairly set in. A real spring day has often tempted to leave off the winter clothing, and the piercing chill of the next day has caused serious injury. One further caution appears necessary; after great perspiration, unless the constitution is very strong, the damp clothing nearest the skin should be removed, and the skin well rubbed with dry flannel or rough linen.

From the first period of infancy the limbs should be allowed full play; and no excuse can justify the parents who, from a regard to the shape of their children, employ tight clothes, either about the body or the extremities. Modern fashion here, however, so much coincides with the sound dictates of physical education, that we need not enlarge upon it. There has scarcely been any improvement in dress more important than the use of loose trousers and suspenders, by which the weight of the lower parts of the dress is sustained by the shoulders, instead of throwing it, as we recollect it to have been, upon the hips, assisted by a tight bandage round the waist. Tight shoes and tight garters (which, if employed at all, should always be below the knee,) impede the circulation, and are followed by considerable injury to the lower extremities. In fact, the rule should be, to have every part of the dress not so loose as to be cumbersome, but perfectly easy: and whenever children complain of uneasiness from their clothes, they should at once be rectified. No trouble or expence will in such cases be thrown away: there is nothing pays better in the long run than early care in the department of physical education. If half the pains and expence were employed in making dresses convenient and healthy, that are now given to appearance, it would answer every purpose.—We need scarcely add, that in the female dress the same principle should be observed; and except in cases where, from medical advice, a different plan may be thought necessary, nothing should induce a mother to allow her daughters any article of clothing whatever, which does

not give full and free play to the exercise of their muscles, or of the internal functions of the system. In the eye of reason that parent has much to answer for, who permits her daughters to use any article of dress causing compression about the waist; much in respect to the health of the individual; much, too, as it respects the health of her children, if she should be a mother, and her capacity to bring them into the world.

Attention to neatness and simplicity of dress should be produced, in the first instance, by parental care; and afterwards enforced by parental example and instructions. This is one of the external habits, which contribute greatly to the moral and even to the mental health.

IV. *Beds, Sleep.*—In the earliest periods of infancy it may probably, in many cases, be necessary to employ warm soft beds, at least during the winter season; but the sooner they can be dispensed with the better. There cannot be a doubt that soft beds have a very enervating effect upon the system: and that so far from contributing to the proper growth of the spine and limbs, they have a great tendency, by yielding considerably in parts, to produce distortion. The mattresses on which they lie should not, however, be so hard as not to yield at all. If hair mattresses, (which must be the best,) are not easily procured, they may be filled with wool or cotton flocks; the head should not be much raised; the child should be induced to lie sometimes on one side, sometimes on the other, and as little as possible we apprehend on the back. A moderate curvature of the body seems preferable to absolute straightness.

It does not appear undesirable to protect the *head* of the bed, especially if there be any danger of a current of air round the room; but nothing more than this. The habit of drawing the curtains close round the bed is highly prejudicial in confining the impure air, and producing an injurious degree of warmth. Proper provision should be made for moderate warmth, but care must be taken not to exceed it. "When young people," says Dr. Beddoes, "complain of unrefreshing sleep they should be examined in the night, and waked without compunction if found too warm. The bed clothes should then be thrown off, or if the dry heat be considerable it will be best to walk up and down the room in a dress which should be contrived for guarding the hands and feet from chill, while it suffered the trunk of the body to be freely ventilated." This may appear a precaution of some danger, as well as difficulty; and referring to an unhealthy state of the system, should not perhaps be adopted without medical advice; but on the following there can be no difference of opinion: "Whenever a person of feeble habit feels heated in a morning let him rise without a moment's delay." The heat of the bed is often increased considerably above that salutary point which at once imparts refreshment and vigour, and then produces fever, languor, and inactivity.

We have already stated in Div. I. that the bed should be raised from the ground, say 18 or 20 inches. As to the quantity of sleep, it must vary greatly with peculiarities of constitution. During the period of growth, if the temperature be not too great, and the room too confined, it is probable that eight or nine hours cannot be too much. Children under the age of eight or nine require an hour or two more. In the summer, however, less will be desirable; for the cool of the evening affords a valuable time for exercise, and the early morning air should not be lost. The middle of the day will then be found the best for rest, in circumstances which will not produce too much heat.

"There is an intemperance in sleep very necessary to be guarded against, because extremely apt to creep upon young people.

people, especially in this cold climate, where it gives a smart pain to jump out of a warm bed into the winter air; therefore, this is a piece of hardiness which cannot be inculcated too early by all the means conducive thereto, whether advice, injunction, or shame. While under the eye of parents or masters, they may be kept constantly to a certain hour, which will make it the easier for them to persevere afterwards, when gotten from under that controul; if no disorder or accident intervene, they will need no more than one nap, which custom will have brought to terminate of itself just at the usual hour; and then if they turn upon the other ear to take a second, they should be taught to look upon it as an intemperance, not at all redounding to their credit. But this second nap is not so bad as lying awake, than which nothing tends more to foul the blood, to sharpen the juices, to exhaust the spirits, to unbrace the solids, to heat the blood, to stupify the understanding, to destroy hardiness, and to produce other inconveniences of very mischievous consequence. Let them seek their amusements elsewhere, but reserve the bed as a place appropriated to sleep and sickness; for if it were possible to live without either of those suspensions of the enjoyments of life, nobody would ever think of making a bed a part of his furniture." To make early rising pleasant and habitual, the first employments of the morning should be pleasant in themselves or their consequences.

The practice should be early begun, and afterwards adhered to as constantly as circumstances will permit, of sleeping singly. Separate beds are of no small service to the physical health; they are of essential importance to the moral health. To prevent departures from this plan, the beds of children and youth should be made as narrow as their comfort will allow, that they may not be used by two, without real inconvenience. If to this separation can be added that of rooms, no doubt the cause of morality must be greatly promoted; and this should be done wherever practicable, unless parents have full confidence in the delicacy of their children.

It may be worth while adding here, that suddenly awakening young children has often a very injurious mental and moral effect. Their first sensations should be pleasant, and we admire the principle upon which that mother proceeded, who always awoke her children with a song. Montaigne tells us, that his father always had him awakened by the sound of a musical instrument.

V. *Care of the Shape.*—The rest of bed is peculiarly necessary for children and growing youth, in order to afford a due degree of relaxation to the bodily system; and till the age of nine or ten, (and afterwards, if there be any marks of debility from ill health or too rapid growth,) children should be encouraged to lie down once or twice in the day, on the carpet or on pallets, in such a posture as may afford the greatest degree of relief to the muscles and joints. "When the least tendency to become awry is observed, they should be advised to lie down on a bed or sofa, for an hour, in the middle of the day for many months; which generally prevents the increase of this deformity by taking off for a time the pressure of the head, neck, and shoulders on the spine of the back; and it at the same time tends to make them grow taller. Young persons, when nicely measured, are found to be half an inch higher in the morning than at night; as is well known to those who enlist very young men for soldiers. This is owing to the cartilages between the bones of the back becoming compressed by the weight of the head and shoulders on them during the day. It is the same pressure which produces curvatures and distortions of the spine in growing children, where the bones

are softer than usual." Darwin on Female Education, p. 76.

Some remarks which might be applicable here will be found in Div. III., respecting the freedom which should uniformly be an object in dress; and we shall not therefore quote some good observations to that purpose, which we observe in Darwin, but must add his last sentence. "A wife fashion of wearing no stiff stays, which adds so much to the beauty of young ladies, has commenced since the above was written; and long may it continue." We are grieved to hear that this excellent custom is now (1814) very much laid aside; and that our fashionable young ladies have returned to the follies of their grandmothers, increasing the injuriousness of their method, by making the pressure more partial. Report says, that even gentlemen now wear stiff stays. To them the injury is less, but not trifling. But this folly can only extend among those whom nothing but experience can cure of folly.

"All other methods of confining or directing the growth of young people should be used with great skill, such as back-boards, or bandages; and their application should not be continued too long at a time; lest worse consequences should ensue than the deformity they are designed to remove. Of these the stocks for the feet of children, for the purpose of making them turn their toes quite out, and the frame for pressing in their knees, as they stand erect, at the same time, I suspect, when carried to excess, to be particularly injurious, and to have caused an irrecoverable lameness in the hip-joint. These, therefore, should be used with proper caution, so as to give no pain or uneasy feels, or not used at all." (Darwin, p. 78.) "Instead of stocks, (says the editor of Parent's Friend, p. 56.) I would advise, that a straight line be drawn on the floor of the school-room, from one end to the other, and that sloping lines be drawn alternately on each side of it at equal distances. These lines should form angles of about 30 degrees (we should say 40° or 45°) with the centre line, and the children be daily accustomed to walk on it, placing their feet behind the sloping lines, so that the inside edge of the foot may exactly coincide with them. This would teach them to turn out both feet equally in walking, which they seldom do, and would give a regularity and steadiness to their gait, without which no one can be said to walk well.

"By confinement in a school room for many successive hours, and that without being suffered to vary their posture, some of the more active and lively children are liable to gain tricks of involuntary actions, as twitchings of the face, restless gelliculations of the limbs, biting their nails, &c. which are generally at first occasioned by the want of sufficient bodily exercise to expend the superfluous animal power, like the jumping of a squirrel in a cage; but are also liable to be caught by imitation of each other. To prevent this kind of deformity, children should be suffered to change their attitudes and situations more frequently, or to walk about as they get their lessons." (Darwin, p. 100.) The reader will find some useful observations on this subject in the chapter on Attention in Edgeworth's Practical Education.

VI. *Diet, &c.*—Under this head we shall not find it necessary to enter much into particulars. The food of children and youth should be nourishing but not stimulating; and as plain as can be. If their appetite be not pampered, or laid under unnatural restraint, it will generally be their safest guide as to quantity. We agree with Buchan, that the error of pinching children in their food, is more hurtful than the other extreme. The disorders of repletion are less injurious in their consequences than the diseases arising from

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the want of sufficient nourishment. Nature has many ways of relieving itself when overcharged; but long fasting is extremely hurtful to young people; and a child who is often pinched with hunger stands little chance of becoming a strong man. "The stomach (says Dr. Rush) is like an idle school-boy, when it has nothing else to do, it is always doing mischief." When children rise an hour and half or two hours before breakfast, we think it very desirable that they should be allowed a piece of bread and a draught of milk or water soon after rising; we have perceived considerable injury arising in the weakly stomach by early fasting. When they have gained some degree of robustness, this may be easily given up. It is highly desirable that the stomach be brought to the capacity of enduring great irregularity in the time of taking food; but in the early periods of invigoration, considerable if not minute regularity in the principal meals is very beneficial. When children fast too long they often do not know how to eat. In such circumstances, a small quantity of warm liquid will restore the disposition to eat, better than dry food. The principal meal should be sufficiently early in the day to allow of their taking out-of-door exercise after it. Perhaps it will generally be found, that about one o'clock is the best time for this; but it does not appear that a nearer approach to the common hour of dinner can be attended with any serious inconvenience, if the previous time be properly arranged for it. Though children should not get the habit of lounging at their meals, any more than at other things, yet they should not be hurried at them; but should be induced to eat their food slowly in order that they may masticate it properly.

We fully agree with Dr. Beddoes on the great desirableness of employing animal food in early childhood and ever after. Some speculatists have indeed attributed the prevalence of consumptive complaints, as well as suicide, in our island, to our free use of animal food; but it appears probable, in the first place, that much more animal food is eaten in countries where this fatal malady occurs less frequently than with us; and, in the next place, that a free use of animal food, instead of being objectionable, is highly advantageous as a security against its attacks. The salutary agency of animal diet in preventing the development of scrofula is now generally known; and the mistakes of those parents, who imagined that, by confining their children to a vegetable diet, they were purifying their blood, while in reality they were starving them into scrofula, are now generally recognized and avoided. (Stock's Life of Beddoes, p. 168.) Cafes may occur, when animal food may be injurious; and these may require at least a temporary suspension of it; but much more injury is done by a spare or poor diet, than by a reasonably full meal of plain nourishing food. Once a day cannot be too often for a meal in which meat should form a chief ingredient; and we need scarcely say, that its proper nourishing effects will be most experienced, where it is full-grown and not over-dressed. With plenty of air and exercise, warm clothing, and moderate temperature, there is little room to be apprehensive of injury from plenty of milk and meat. On the contrary, the best effects on the health and vigour of the system may be expected.

Professors Hufeland tells us, that those parents who accustom their children to drink water only, render them a service, the value and importance of which will be sensibly felt through life; and we fully agree with him. No beverage can be more wholesome, and we will even venture to say on the whole more nutritious, than good spring water. Those who have any acquaintance with animal and vegetable physiology, will not be surpris'd at the last part of this as-

sertion. But if we leave out of view its nutritious qualities, and consider it merely as a beverage free from the noxious qualities which forcibly present themselves to the minds of those who connect the future periods of life with the present, and which must induce them to shun the early employment of stimulating liquors of any kind, it is invaluable. It would amply repay the parent to give up the use of every stimulating beverage with his meals, for the sake of example to his children, and with a view to produce that habit of early temperance which cannot be too soon acquired. We have known the sips of wine and of ale, which many would think mere trifling indulgences, produce a propensity to the use of strong liquors, which has been attended, even at eight or nine years of age, with intoxication. And it shocks us to see parents so regardless of the bodily, as well as the moral health of their children, as to give them, when very young, (perhaps when three or four years of age, or even less,) a glass of unmixed wine, and even urge them to drink it. These same persons would be themselves averse to give their child half the wine glass of brandy, and yet the quantity of alcohol differs little in the two cases. Wine should be reserved for a medicine; and there may be times, even in childhood, in which, when diluted, it may thus be usefully employed. But in such cases, with a view to the future, no pains should be taken to render it palatable. The true way to prevent an early taste for stimulating liquors of any kind, is not to make them the subject of direct prohibition, but to keep children out of the way of them, and to accustom them to simple food and drink. Where the stomach of a child is not unnaturally excited, there will be little disposition to the use of fermented liquors. But if drinking them be made the subject of boasting, or even of expressions of lively pleasure, in the presence of children, our precautions may be easily rendered ineffectual. If a parent finds it necessary to introduce to his table visitors who will be thus careless of the moral welfare of the young about them, let his children take their meals in a separate room, till he has acquired such power over their minds as to prevent the mental poison from operating. Then it may be best for him to let them be exposed to it. They must eventually; and it is better that this should be done before the mind is likely to be so much influenced by it, as it would be at the more advanced periods of youth, when the antidote will not be at hand. But before that period, if wine is to be introduced at meals, and the bottle to be circulated freely afterwards, and made the subject of conversation, at least let not children be exposed to the impressions of the scene. Those who have known boys, under twelve or fourteen, habitually fond of intoxicating liquors, and taking various underhand methods to procure them, and even experiencing intoxication thus early,—who have known, too, a habit thus early begun, continued through all its stages, till life has been prematurely cut off by its poisonous effects, when the age of manhood had scarcely been reached,—will think no instance of self-denial or of prudential caution unreasonable, to prevent the possibility of such evils in their own families. Whether we consider it in its present and future beneficial effects on the bodily organs, (the digestive, biliary and nervous systems,) or in its great tendency to promote the culture of self-control as it respects the corporeal desires, the habit of temperance cannot be too early begun or too steadily pursued. Its physical, mental, and moral influence, its influence on health and happiness, entitle it to a high rank among the virtues of life. At first it will be a mere habit, formed only by parental care and influence; but as the child advances towards maturity of understanding, every

judicious means should be employed, to give it the obvious and impressive functions of prudence and of religious duty (for such it has in every point of view that it can be considered); and these representations will be easily understood. The proper time for introducing them, is when any striking instances of the injurious effects of intemperance will render them impressive; and a few short *home* statements on the subject may then be of incalculable importance and efficacy.

With a view to such statements, we recommend to the judicious parent, (at least if not liable to excessive nervous excitement,) the study of Dr. Beddoes's eighth Essay, on the preservation of the physical power of enjoyment, including some remarks on food and digestion. They will find there "a description of the stomach and of its various states of distention and emptiness, with the corresponding sensations by which these states are accompanied. The progress of digestion is described in a manner strikingly clear and intelligible; and this is followed by an inquiry into the principal agents by which this process is impaired, and the digestive organs injured." The young often injure themselves for want of proper information on the subject of the bodily functions; and the parent may, from such sources, derive those which will enable them to render their children most essential service. Dr. B. appears to us sometimes to colour too highly; but the most important parts of his Hygeia we cannot doubt to be fully borne out by correct observation and experience. For the purposes of health, it appears that to take spirituous liquors, (whether in the form of wine or what are commonly called spirits,) after a meal, is of all periods the most improper. Proper food taken in proper quantity is exciting enough for the strong, and without caution is apt to be over-exciting for the weak. Fermented liquors act with peculiar severity on the tender constitutions of children. They stint their growth and impair their appetite. Numerous experiments prove this fact; and the indigent classes have, in some instances, availed themselves of a knowledge of it to still the cravings of that hunger which they had not the power of appeasing by a sufficient quantity of wholesome food. These facts ought to operate as a serious warning to the imprudent parent, who indulges his children in such a fatal gratification. They want no source of artificial exhilaration to beguile their time; however it may be sought, for those purposes, by those of more mature age, too little remembering that the pleasurable feelings of existence which arise from the products of vinous fermentation can only be momentary, and must be succeeded by a proportionate degree of depression and at last of gloom. (Stock's Life of Beddoes, p. 236, &c.) The following remark of Dr. Currie (which should have been introduced in Div. II.) deserves great attention: "Though *spirituous liquors* may fortify the body against the effects of heat, combined with moisture, and may perhaps support it for a short time under great fatigue, *they are, I believe, uniformly hurtful when taken under severe and continued cold.*"

We are not apprehensive that we shall be considered as digressing on this point. That education, which, while it gives health and vigour in the early part of life, secures strict temperance and moderation in every kind of animal gratification, is rendering a most essential service to the mind and the body. The work of mental and moral culture may then be not only begun but pursued with steadiness and success; and that invaluable blessing, *mens sana in corpore sano*, will make the parent for ever recollecting with the most lively feelings of affectionate gratitude.

We must revert a little more to the subject of *water*. To have its proper effect it must be *pure*. Two precau-

tions, therefore, are to be attended to respecting the water which is constantly employed in food. The first is, that it be free from the oxyd (or rust) of lead; the other, that it do not contain too great a degree of earthy matter.

"Pure water has no action on lead; but it takes up a small proportion of the oxyd of that metal. When left in contact with water, with the access of atmospherical air, lead soon becomes oxydized and dissolved, especially if agitation be used. Hence the danger of leaden pipes and vessels for containing water which is intended to be drank. Water appears also to act more readily on lead, when impregnated with the neutral salts that are occasionally present in spring water." (See Henry's Chemistry, vol. ii. p. 89.) Vats of lead have been used in some cider countries which have produced incalculable mischief. What is called the Devonshire colic is occasioned by this practice; and is identified, by its effects on the system, with the colic of the plumbers, the painters, and the white lead makers. "Lead in its metallic state, like all other metals, is probably inert; but it is so easily acted upon by the weakest acids and alkalies, that it cannot be taken without the most imminent danger." Johnstone on Poisons, p. 113. (See Parkes's Chemical Catechism.) The presence of any quantity of lead sufficient to produce injurious effects on the system, may be discovered by an addition of the sulphuret of ammonia or potash. (See Henry's Chemistry, vol. ii. p. 394, &c. in the chapter on the method of detecting poisons; where also will be found some valuable remarks on this and other connected topics.) The other point is, that the water in constant use shall not contain too large a proportion of earthy substances. (See Parkes, p. 243.) If the water is perceived to be particularly *hard* in washing with soap, or, if in boiling it, there is a great deposition of earthy matter on the internal surface of the vessel, it is, probably, likely to have injurious effects. Boiling it would deprive it, in a great measure, of its earthy mixture, but it will also deprive it of its briskness. Whether passing it through a filtering stone would take away the earthy substance we do not know; but we have known this process to give rain water (by its passing in small quantities through the air) that briskness which makes water a real luxury to those who habitually employ it. Probably the trouble, and certainly the expence, attending the procuring of good water from a spring, even at some distance, would, in general, be very much less than that arising from the employment of fermented liquors; and there would be the satisfaction attending the former, that it was certainly for the purposes of health.

It is necessary to say a few words on the subject of *tea*. We agree with Beddoes (see his third Essay) in almost every particular respecting it; and in this we are influenced by considerable experience and observation. We are not averse to the use of it in a moderate degree and of a moderate strength, especially among *young men*. The habit of afternoon tea-drinking has often a close connection with domestic dispositions, and tends to society at least less injurious than that of the bottle companion. It appears also to furnish, when thus limited, only a salutary refreshment after fatigue of body and mind. As long, however, as the stomach will bear a milk breakfast. (which might be diversified by using it in various forms,) so much the better. When tea is employed for breakfast, it should be weak, cool, (little, if at all, exceeding blood heat for instance,) with a large proportion of milk, and as much sugar as will render it palatable without sickening the stomach, and accompanied with plenty of toasted bread or thinly spread bread and butter, (in other words there should be as

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little tea as possible in the whole,) and we imagine that then no direct injury can result from it. The afternoon tea should be prepared in the same manner. If it is used in any form in which its stimulating effects are experienced it must be prejudicial to the young: and the tendency of the present employment of weak and well prepared tea, to lead to the injurious use of it hereafter, renders it desirable to keep clear of it as long as may be. Green tea possesses a power over the nervous system, which should completely prevent the general employment of it by any one. Like other strong stimulants it should be reserved for the period when it is requisite as a medicine, if there be such a one. Black tea is certainly less injurious: but even this (at least without such precautions as above stated) must affect the irritable habits of children too violently, to justify the use of it as a part of their daily diet. We recollect observing the effect of tea upon a boy of about nine or ten, (the same referred to under the head of *Bathing*,) having taken some strong green tea, with little milk and bread, and no sugar, he began about an hour and a half after to manifest excessive depression, accompanied with weeping, for a considerable time. He was, in some measure, restored to his usual tone by a comfortable supper; it is probable that as the stimulus had thus exhibited its genuine effects afterwards it had done so in the first instance by producing a temporary exhilaration.

One point connected with this head we do not wish to omit, because we deem it really important, though we doubt whether even the authority of Locke will appear broad enough to shelter us completely. The philosopher devotes five sections to the subject in his *Thoughts on Education*; we shall take the abridgment of them, which we find in the *Parent's Friend*, vol. i. p. 5.—“One thing more there is which has a great influence upon the health, which is costiveness. The contrary extreme is always attended to, and can sooner be remedied; but costiveness is harder to be dealt with by physic, as purging medicines rather increase the evil. I believe the best remedy is, for people always to solicit nature immediately after their first eating of a morning; and by this constant application they might bring it into a habit, whether they are at first called or not: and they should never let any human affairs prevent this necessary attention to their health. Children should be early accustomed to this, and should not be let go to play till they have been effectually at stool, as there is reason to suppose that many children neglect the gentle calls of nature, when they are very intent on their play.”

VII. *Muscular Exercise*.—Healthy children will exercise themselves sufficiently if they are allowed: and they should be allowed, during the period when the body is the first concern, almost as much as they please; and, after that period, as much as is necessary for the vigour of the body, if it were only with a view to the vigour of the mind. They should be *encouraged* to such bodily exertions as will call into play the muscular system generally; seldom excessive or violent, but active and vigorous; proportioned in fact to the degree of strength actually possessed; and so contrived that, while it benefits the present health, and suits and excites the lively spirits of youth, it may also lay in no store of injury for the future. The last principle excludes those violent sports, which, before unusual vigour has been acquired, can scarcely fail to over-excite the system, and produce lasting injury to it. So far, indeed, from wishing to see boys and girls shrinking from exertion, or the apprehension of pain, we would have their education so conducted, that they shall be at all times ready to en-

gage in any exercise which is not beyond their strength, and ready to undergo *any* pain that will have only an *immediate* and *temporary* effect. Those which *really* and *considerably* endanger the limbs, or the senses, the health, or even the lives, are what we term dangerous sports; and the danger should be early and repeatedly pointed out to children, and such sports prohibited: but all that are active, that exercise the bodily or the mental vigour and ingenuity, should be encouraged, and sometimes assisted by advice, or by the parent's taking a leading share in them. We say sometimes, because as much as possible should be left for children themselves to do. Parents should sometimes lead, but only in order to teach them to go alone: and except when this is the object, the parent will be of most service, by taking only an ordinary play-fellow's share in his children's amusements.

When children are healthy, and have been accustomed to a few simple sources of amusement, to such playthings as they can use freely, and as will call their minds into exercise, they will invent for themselves; and all that is necessary is, to give them a dry airy room in doors, and a dry airy spot out of doors, where they can play freely and actively, and to furnish them with a few implements for amusement suited to their age, such as the recollections of an active childhood will readily suggest. The rest they will generally do for themselves. A little indirect aid may sometimes be of service to give a right direction to the stimulus of their own minds; but the less direct interference the better.

We hear a great deal of boys loving play too well; and there are, doubtless, instances in which a real love of play has been attended with little or no marks of mental activity; but we see every reason to suppose, that if a boy play *well*, (with activity, spirit, and ingenuity,) it only wants proper management to make him work well. Of such a one, at least, we should ourselves never despair. If children are indolent at play, it must be from a want of sufficient animal health and spirits, and proper means should be employed to restore them to that state. A child in thoroughly good health, will, at times, be as playful, and full of antics, as a young kitten; and without indulging that boisterous rudeness, which is inconsistent with domestic comfort, and with the necessary degrees of order and propriety, and even with the health and comfort of the children themselves, every possible indulgence should be given to their lively spirits, and to their cheerful noises.

At the period when the habit of *hardy* application is to be begun, we do not wish to see work treated as play: and, on the other hand, play should never be made work. Children may often be *led* to do, that which they have no direct inclination to begin; and a little skill in bringing about this beginning is often of real advantage. But exercise will be of the greatest use, (it will most call into exertion the physical powers, and contribute most to the health,) when it is indulged involuntarily and with spirit. Those exercises which are *expressly taught* with a view to form the limbs, and give young persons a proper command over them, must, we apprehend, be excepted (we refer to dancing, drilling, fencing, &c.); and it may sometimes be necessary, for a time, to make them compulsory; but by proper care and perseverance, they will become pleasant enough. We think highly of all these exercises. Dancing is often abused; often made the source of vanity, and sometimes even of sensuality. Exhibition-balls for children and youth we deprecate; and are satisfied that the evils attending them are many and great. The private cheerful dance, where con-

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ducted with propriety, and not carried to excess, (by overheating or over-exerting the system, or by encroaching upon the part of the night which health requires to be spent in bed, an hour or two before midnight,) we think a salutary amusement, good for the body and for the mind. If it have the effect the next day of producing languor and inaptitude for the common employments of life, then it has been carried to excess.

It has been proposed to make *gymnastics* a part of the regular business of education. A tame spiritless exertion of the body is worth little. Some good may be done by it; but what should be the object of the parent, is voluntary active exercise, in which the whole soul is for the time engaged. The formal walk, even in the fields or on the seashore, however much it may please, by contrast from sedentary amusement, and which it will do only in proportion as that amusement has been kept within its due limits, cannot have nearly the same beneficial influence on the body, or on the mind, as the lively sportive exercise which healthy children will take of themselves. A troop of boys or girls, turned into a field to find amusement for themselves, and left at full liberty, except that of transgressing the bounds which mental or bodily health prescribes, will do for themselves, that which no one else can do for them; they will be gaining life and vigour, muscular activity, and, what often is intimately connected with it, mental activity. Still we are disposed to allow, that regular attention to gymnastics should make a part of the system of education; but then the regularity of the management of it should be kept out of sight as much as possible. The parent or the tutor may plan and lead to the execution, but the execution, and, as much as possible, the plan, should originate in, or at least excite the ingenuity, the dexterity, the exertions, &c. of the child or youth. If children are not early allowed full employment for their bodies they may require to be taught to play; but the art employed to teach them should not be brought into view. In fact children teach themselves best; and the inspecting, controlling, directing power of the older friend should seldom be the direct object of observation. He may notice in silence, and give hints from what he has seen, which will do every thing that is necessary. Constraint destroys the very life and soul of play. From what we have seen of an octavo volume, entitled "*Gymnastics for Youth*," translated from the German, we think that the parent, (under which general appellation we usually include the tutor or parental friend,) may derive some useful hints to aid him in the great and important object of bringing the muscular system into full vigour and activity. We must by no means omit the valuable chapters on Toys and Machines, in Edgeworth's *Practical Education*, which every reader of this article probably has access to. And from extracts which we have seen from Parkinson's *Dangerous Sports*, we expect that valuable cautions may be derived from it, deserving the attention of the judicious parent.

We would not have the prohibition of dangerous sports carried too far. Those whose consequences may be, and especially those whose consequences will probably be, fatal, or the injury irremediable, should be absolutely prohibited, and the disposition to avoid them produced by considerations of prudence and benevolence. Forced exertions beyond the strength, blows on the head, stomach, &c. injury in the eyes from any cause,—these, and all others coming under the above description, should be the subject of frequent caution. But in real life occasions continually occur, in which pain must be borne, or in which some degree of risk must be run; and that education must be radically defective, which does not sow the seeds of fortitude and presence of mind.

Nothing will teach these qualities but exposure to pain and some degree of danger. We do not mean a voluntary direct exposure; but we would check that excessive caution on the part of the parent, which shuns present suffering at the expense of future strength of mind. The benumbing influence of fear injures beyond calculation; and though we have no wish to see foolhardiness, which is bold because it is unacquainted with the real extent of the dangers it runs into, we do always rejoice to see in a lad firm endurance of pain, and active boldness, under the guidance of some little prudence and ingenuity in extricating himself from risk, without paying more attention to the danger than is necessary to escape from it. Cowardice is so often, we might say so constantly, the source of meanness, and all its accompanying vices, and (even where the moral education has checked these) is so often a bar to valuable exertions for the good of others, that every indication of it should lead to proper methods to eradicate it. Some may suppose that all that is necessary is to give strength and health. So far from fortitude being a necessary attendant upon these, we have seen reason to consider it as a more constant companion of activity of mind, united with less robustness of body. Activity is the grand point; this will lead a boy into risks, (we do not mean of fatal accidents, but of such as for the time may be painful,) and the same activity will often suggest expedients to escape from them; and the more this is done in early life, the more self-command and presence of mind will be practicable, when necessarily exposed to great and imminent danger. Presence of mind, as Miss Edgeworth has well observed, is, in reality, absence of mind, as far as the danger is concerned: on that it does not dwell, but upon the expedients of escaping it. And it must require uncommon mental culture in the later period of life to acquire this invaluable quality, where fear has been the habit of the earlier.

The little accidents of childhood and youth should not receive too much sympathy. All that is necessary for their relief should be done, at least in the earliest stages of education; but the little mind should be excited to bear its pain, by pleasantry, or even raillery, by appeal to shame, by turning the attention from it, in short by any and by various methods, those being selected which experience has shewn to be most effectual for the individual. After the first period of childhood, their accidents should receive very little direct attention; the parent will observe, but the observation need not be made to excite their notice. He should be ready to step in where necessary, but in common cases leave them to act for themselves. Indeed this is one grand object in education, to enable the individual to act for himself, when the great business of life depends upon his own wisdom and exertions.

When the dread of pain (even where the mind is unsupported by sympathy, or not stimulated by the dread of shame) is in a considerable degree subdued, or made inactive, (in other words, when fortitude has been acquired,) there is only one thing more requisite for effectual presence of mind, and that is a knowledge of the best methods of escaping danger, a readiness of invention, and the adoption of means to ends. These are more intimately connected with the culture of the imagination and the understanding. To produce them, the young should often be led to consider what is best to be done in accidents of different kinds. "What would you do if your clothes were on fire?" we would ask a girl old enough to understand and to act. "What would you do if your brother fell into the water, or fell down and broke his arm?" are questions which would lead to useful conversations with a boy. When occurrences

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of this nature are mentioned, the mind of an intelligent youth may be set to consider what should have been done, and then compare it with what was done. Where this turn is given to the inventive powers, highly useful results might be expected, not only when in actual danger, but in providing against the accidents of human life for others. Newton Bosworth's little book, entitled *Accidents of Human Life*, will furnish some useful hints; and it would be well to keep a common-place book for this express object, which might be stored with facts of actual occurrence, and with suggestions as to probable cases in future. An acquaintance with the structure and functions of the body, with chemistry, and with mechanical philosophy, cannot fail to be of great use for this object, and attention to them with this object in view, will be of service in others. Our readers will find some hints which may be of service in *Intellectual Education*, Div. V; and still more towards the close of Miss Edgeworth's chapter on Attention. The excellent little dialogue in *Evenings at Home*, called *Presence of Mind*, well deserves the perusal of parents as well as children.

To any one who fairly considers the way in which the bodily and mental faculties are developed, it will appear abundantly clear, that exercise is as much required for the one as for the other; and as the mental progress so much depends upon the health of the body, even if that be to be regarded as the primary object, this must on no account be neglected. "Exercise is necessary for health, bodily and mental," should be the fundamental maxim of every system of education private or public. It is a law of our natures, against which no one can offend with impunity; and such arrangements should be adopted in every school, and in every domestic plan, that it may be fully and effectually obeyed. Sedentary employments should be frequently relieved by active muscular exertion. It is a bad thing for the mind to be kept on the stretch too long; and, therefore, sedentary amusements are often necessary; but sedentary amusements should only be resorted to where active sports cannot be had. Bodily activity is almost an essential requisite for mental activity, and indisputably for the full enjoyment of health. If from any circumstance the school hours exceed two or at most three hours at one time, let a break be made at some convenient place for "a good batch of play." Little will be lost by it for the time; much will be gained for the future. Exercise out of doors, where dry good air can be had, is, in every point, greatly to be preferred; but where the rain and chills of our climate will not permit, still let it be had within.

When children have been sitting so long, that they feel indisposed to bodily exertion, there is no doubt they have fat too long.—"Like every other organ, the palate and the stomach, when left inactive and unexercised, lose their original faculties. Repeated fasting is fatal both to appetite and to digestion. Sedentary occupations," we would say too long continued, and disproportioned to the age and degree of muscular maturity, "gradually destroy the desire, and impair the power, to exert the muscles, more particularly while they are forming."—"To debar children from giving loose to these inclinations, by indulging which, they knit their sinews, swell their muscles, and harden the whole against the vicissitudes of air, is a kind of severity neither indifferent to them or to those about them, for the present or for the time to come."

It really appears somewhat unnecessary to dwell upon this subject as we have done; and yet it is difficult to meet with any plan of education into which it enters as it ought. In making the above quotations from Beddoes (Ed. iii.)

we observe, that in his plan for a girl's school, which we think in many points very judicious, (though clearly formed more with a view to *weakly* children, than could in general be desirable for girls and still less for boys,) he lays down the following precept: "under twelve years of age it should be an invariable rule, that the hours of application should never exceed those of amusement and exercise." The principle is a good one; and it should not much be departed from, till the period when application becomes voluntary and pleasant; and then some portion of the hours for *amusement*, we do not include those of *active exercise*, may be added to those of application. We are inclined to think that, in general, for boys between ten or eleven and fourteen, nine hours sleep, eight hours work, and seven for meals, exercise, and amusement, is a good division. Those, who see reason to adopt our views in *Intellectual Education*, especially under the heads of *Attention* and *Memory*, will be of opinion, that Dr. Beddoes' plan is in these points radically defective. It affords useful hints, but it cannot be followed, we apprehend, and at the same time mental *vigour* be obtained.

But while we say this, we must add, that we deprecate, as he does, excessive mental exertion in children. The physical system must be the first object. If the order of nature be reversed, the mind will eventually suffer for it, as well as the body. It would often be easy for the skilful parent to make a child a prodigy; but the judicious parent never will attempt it. Premature and luxuriant growth of mind will seldom, if ever, be found to spring from a vigorous root. It will be viewed by those, who know the laws of human nature, as a disease; and such it will generally prove, even in the estimation of the mere superficial observer. We do not doubt, that many have sunk into an early grave, through the unnaturally rapid development of their faculties, and the excessive excitement of mental and physical sensibility, which is usually the cause or effect of it; and still more have had the progress of their bodily health and strength impaired; their minds have sunk into a state of stagnant listlessness; and the promise of early genius has been completely disappointed, and followed by a train of physical and mental and moral evils, which should serve as a beacon to the vain or the unwary.

Though this article is expanding beyond our wishes, we cannot forbear presenting our readers with another extract from Search. The Light of Nature may not be accessible to many; and this passage is truly important, and deserves to be carefully weighed by every parent.—"Nor is it enough to restrain sleep within due bounds, if the waking hours be suffered to dream away in a torpid indolence not much different from sleep. It is of great service, even to the health, to cultivate a spirit of activity, continually exerting itself in some exercise either of body or mind. The former is more necessary for the animal machine, and for that reason deserves to be particularly regarded for such as are destined to follow some sedentary profession, that they may be inured by early custom never to sit still with their hands before them in the intervals of business, but to move briskly in their common actions, and daily to practise such recreations as may keep the circulation to its proper flow, and prevent ill humours from gathering in the blood.

"Yet an activity of mind, too, is not useless to the body; there being such an intimate connection between the grosser and finer organisations, that irregularities in the one, will not fail to produce their like in the other. There are some who love to sit in a corner, building castles in the air, musing upon improbabilities soothing to their fancy, and wishes of what can never happen, or perhaps upon something

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something that has vexed them, or the imaginary dread of mischiefs never likely to befall them; though this may seem an intenseness of thought when the mind is rather too busy than too remiss, it is in reality not an activity, but passiveness bound down to an object rising mechanically in the imagination. Tempers of this cast have a perpetual listlessness and dilatoriness, they apply to nothing readily, they do nothing currently, but want to put off every thing another minute, even their meals, their diversions, and their beloved nightly repose. Such stagnation of thought, become habitual, must inevitably introduce a like stagnation of the vital juices, fret and waste the spirits, generate fearfulness and melancholy, and impair the health more than will be easily imagined.

"This mischief then deserves an early attention to obviate, the more because difficult to be discovered in its beginnings; for we cannot penetrate into the thoughts to see what passes there: but before grown inveterate, it will shew itself in the actions, or rather in the inertness of disposition; and then no time should be lost to cure it, nor any means omitted that can be devised to teach children to find an issue for their thoughts by running them in current trains, and to take pleasure in making good dispatch of every thing, as well in their tasks as their amusements.

"Nevertheless it must not be forgotten, that there is a contrary extreme, which urges to make more haste than good speed; a continual hurry and agitation, never satisfied but when in motion; an impatience to do things before the proper time, and eagerness to dispatch them at once by a violent exertion; an over-solicitude for the success of measures, and a vexation upon any rub happening to fall in their way. This temper likewise is unfavourable to the health; for mischief will ensue upon precipitating the circulation of blood and animal spirits, as well as upon retarding it. A calm and steady alertness, flowing in one uniform tenour, always brisk and lively, never anxious nor trepidating, is the desirable point to be pursued: therefore, we must so labour to cure one evil, as not to incur another; and keep an eye upon Scylla, while we endeavour to steer clear of Charybdis. I know it is a difficult matter, perhaps impossible, to hit exactly the golden mean; but we shall come the nearer, by being apprised of dangers on either hand: though I think the former is the greater, the more frequently fallen into, and harder to be cured. The best that can be done must be by diligence in watching the approaches of either, and applying the proper remedy as soon as they are perceived."

In what we have said, we wish to be understood as referring, unless otherwise expressed, to girls as well as to boys. We are fully satisfied that there is a constitutional difference in the sexes, which is perceptible even from infancy; and that the parent, who should train up her daughters to all the most robust exercises of boys, would find that she had carried the matter too far. But we are also satisfied, that this constitutional difference is unnecessarily and most injuriously carried beyond all the bounds of nature, in the common modes of educating girls. We recommend to mothers, especially, some remarks on this subject in Reflections on the present Condition of the Female Sex, by Priscilla Wakefield; a writer who has contributed well to store the children's library with works containing really useful information. "How often," she says, (we quote from Parent's Friend,) "has our anxiety for the delicacy of the complexion, or the apprehension of her becoming a romp, restrained a girl from the indulgence of enjoying either air or exercise, in a sufficient degree, to secure her from that feeble, sickly, languid state, which frequently

renders her not only capricious, but helpless through the whole course of her life. There is no reason for maintaining any sexual distinctions in the bodily exercise of children. If it is right to give both sexes all the corporeal advantages which nature has given to enjoy, let them both partake of the same rational means of obtaining a flow of health and animal spirits, to enable them to perform the functions of life."—"Employment should be contrived, on purpose to induce them to pass a large portion of their time in the air; nor should they ever be permitted to sit within long at a time. A mere walk scarcely supplies sufficient exercise to produce a quick circulation; something, therefore, more active should be adopted. Running races, trundling a hoop, skipping with a rope, battledore and shuttlecock, ball, jumping, dumb bells, swinging, and many other amusements of the like nature, are suitable for the purpose, and may with equal propriety be practised by both sexes, being by no means incompatible with delicacy of person and manners. Let it never be forgotten, that true delicacy consists in a purity of sentiment, and is as much superior to its substitute, external manners, as a real gem to one that is artificial."

VIII. *Exercise of the Senses.*—It is certainly possible to have eyes, and yet not see; and to have ears, and yet not hear. This, however, is in general more owing to the sluggishness or inattention of the mind, than to the imperfection of the external organs of sense. Impressions on the organs of sense, which, if the attention of the mind were actively directed to them, would convey clear, vigorous, and well-defined sensations, may either excite a mere partial or fleeting notice, or pass away without any sensation whatever. See *Mental Philosophy*, Div. I.; and in connection with other topics of this division, the reader will probably find some advantage in consulting Div. II. also.

In *Intellectual Education* we have endeavoured to mark the distinction, which is too seldom observed, between *sensations* and *perceptions*; and we shall not enter upon the subject again. The reader will find the first four divisions of that article bear closely upon what may well be termed the mental processes of perception, and we beg leave to refer him to them for this purpose. Dr. Reid, in his *Essays on the Intellectual Powers*, has a distinct chapter on the improvement of the senses (Essay II. chap. 21.); but from the views which that philosopher took of the nature of perception, it might be expected, and it is accordingly the fact, that he says but little on the improvement of the *senses* properly so called: it is principally on the improvement of the perceptive power. The philosophical reader may, however, find it worth while to consult that chapter; and the judicious, but inexperienced mother will also derive much useful information from the second and third letters in Miss Hamilton's second volume.

That the perceptive power is susceptible of very great improvement, by proper exercise and culture, there can be no doubt; but some may doubt whether this is the case with respect to the bodily organs of sensation. When it is considered, however, that improvement, as the consequence of due exercise, is the grand law of our physical and intellectual powers, it might be inferred that the external organs are, by the same means, susceptible of improvement, in furnishing correct and vivid sensations. And when it is considered that even well-formed healthy infants indicate little sensibility of sight and hearing for many days; that there are manifest and great differences in the animal tribe, in the powers of sensation; that even where there is the power of vigorous attention, children greatly differ in the correctness and vividness of their sensations; that those who are accus-

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to med to observe objects of a certain class, not only have much more ready and accurate perceptions, but even can at once discern, where sensation only is concerned, what very close attention will scarcely enable another to see; that those who are deprived of one of the three organs of intellectual sensation, acquire a peculiar susceptibility, not only of perception, but of sensation from the others; and that at the period of natural decay, and even earlier, there is a great diminution of the power of sensation; it appears to us scarcely to be doubted, that the bodily organs of sensation are susceptible of great variation and improvement in the same individual.

Even if this should still be regarded as matter of theory, it is obvious that no effort in endeavouring to improve the senses can be lost: for by the same means we shall be effectually improving the faculty of perception. And, on the other hand, whatever means are taken to exercise the perceptive power, these will, upon the above principle, cultivate also the organs of sensation. The exercise of the bodily organs, and accurate attention to the impressions upon them, are, in fact, the only direct means by which this last object can be effected. The indirect means are of indispensable importance, and will do much towards rendering the direct means of real efficacy: we refer to those means by which the bodily health, vigour, and activity, are to be obtained. The exercise of bodily vigour, and especially of bodily activity, not only has the effect of strengthening the nervous system generally, and of giving it a *healthy* sensibility, but it furnishes constant exercise for the organs of sensation. The useful playthings of childhood and youth, and their employment out of doors, are continually calling these organs into activity; and that agility in muscular movements, with which health and activity are so often attended among the young, and which contributes so much to give bodily dexterity, is peculiarly serviceable in calling into play the power of sensation also. Dexterity does of course imply the quick and vigorous sensation, and accurate attention to it, and the ready association with it of the appropriate muscular movement; and where it is exercised, there the organs of sensation must also be exercised. In short, wherever and however the attention is directed to the objects of perception, whether in the way of simple observation, or of comparison and discrimination, the corresponding organ of sensation is undergoing a proper culture.

Hence a great deal may safely be left to the mere influence of external objects, provided the attention is pretty steadily and frequently led, directly or indirectly, to the perceptions. A child who observes much, must acquire quickness of perception; a child who observes accurately, must acquire accuracy of perception, and consequently must acquire quickness and accuracy of sensation. But there are few cases in a judicious education, in which all will be left to this indirect exercise. During the plays and employments of childhood and youth, various means may be devised of calling the senses into activity, and directing the attention to them. In the book which we before referred to, "*Gymnastics for Youth*," there are some useful suggestions respecting the method of artificially exercising the senses, which we think may be serviceable to some of our readers, and which we shall give in the form in which we find them in the "*Parent's Friend*."

"Besides the natural exercise of the senses, I think it might be possible, by artificial means, to increase the power of each sense, in the same manner as hundreds of deaf and blind persons, who supply, to an astonishing degree, the loss of one sense by the zealous cultivation of another. Accordingly, in exercises of this kind, sometimes the eyes

should be covered, sometimes the ears prevented as much as possible from hearing, sometimes the rest of the senses kept as free as may be from impressions. When children have acquired considerable readiness by the natural exercise of the senses, in their eighth or tenth year perhaps, I consider it as a very pleasing and useful occupation to exercise them artificially in the following manner." Though the author speaks of the age of seven or nine as a proper time for the artificial exercise of the senses, it is obvious that it may be begun with advantage at a much earlier period. In fact, it can scarcely be begun too early. But, throughout, it should be conducted as little as possible in the way of a formal business. The exercise of the muscles, and the exercise of the senses, should be made as interesting as possible, and seldom employed except in the way of amusement.

(1) "*Exercise of the Touch*.—The much greater promptitude of the sight and hearing, evidently leads us to neglect the sense of feeling; whence I am induced to think, that this deserves our greatest attention. The eyes are to be previously covered, and then let the person so blindfolded discover persons by feeling their faces or hands; distinguish coins; tell what a person writes in the palm of the hand with a pencil or point of a skewer; distinguish the leaves of all kinds of trees and plants with which he is acquainted; estimate the degree of heat, air, and water according to the thermometer; distinguish plates of polished metal, of similar figures, by their specific heat; estimate the weight of various substances in pounds, ounces, and the smaller weights; tell all kinds of wood, and the different productions of the loom; estimate the number of leaves in a book and tell the pages; among a number of leaves of the same kind of paper, separate the blank, written, and printed; write; estimate the length of various sticks in feet and inches, the superficies of a table, the solid contents of substances of regular figures, and the capacities of different vessels; mould easy figures, mathematical for example, in clay or wax, paying attention to the size as well as the form; make pens, and cut out various objects; distinguish all kinds of substances put into his hand, as chalk, sealing-wax, &c.: let him endeavour to feel impressions in relief, as upon large coins.

(2) "*Exercise of the Sight*.—Let him estimate every relation of magnitude as it exists in nature; length, breadth, height, depth, superficies, solidity, and distance: both in the great, as yards, furlongs, miles; and in smaller dimensions, as feet, inches, lines. The conjecture should always be compared with actual measurement. This will at the same time afford a pleasing mode of practically acquiring the art of mensuration. On sultry days, for which more violent gymnastic exercises are not so well adapted, I have often had recourse to these, and found that young persons very soon acquire a considerable readiness in them. It is above all things necessary to imprint as deeply as possible on their minds accurate ideas of the different measures. When this is done, they will soon learn the art of applying them in all directions, and thus measure with the eye. Let him draw all kinds of mathematical figures without compasses or ruler, divide lines into a given number of parts, cut measures of feet, inches, and lines upon sticks, copy mathematical figures in perspective from models, draw schemes for them, cut them in paper, and put them together. All this must afterwards be examined by mathematical instruments, and the errors corrected. Let him take for a pattern a picture, on which are many different shades of colour; compound every shade in it from the seven primary colours, and lay them all down upon paper; or let him merely declare of what colours each shade is composed. Let him estimate the weights of

various bodies by looking at them. Let him stop his ears with his fingers, and hold a conversation by observing the motion of the lips.

(3) "*Exercise of the Hearing.*—The youthful company, in which the fewer there are the less noise is to be apprehended, being all blindfolded, their master will do various things, and they must tell what he is about; in other words, he will occasion some noise in different ways, and they must explain whence the noise arises. This admits of great variety. All common actions, such as walking, writing, making pens, and the like, are easily discovered; accordingly the master will proceed to such as are more unusual, for instance stepping upon a chair, or sitting down on the ground. When these are discovered, with tolerable facility he will go farther. He will bid them guess the figure, size, and substance of things by the ear. For example, whence proceeds that sound? from a glass, a basin, a bell, a piece of iron, steel, copper, silver, wood, the table, or the bureau? Of what size, and of what shape it is?

(4) "*Exercise of the Smell and Taste.*—A person blindfolded may distinguish flowers, various articles of food, many metals, leaves of trees, fresh, and in many cases dry pieces of wood, and several other substances, by the smell alone, without touching them, and most of them by the taste."

IX. *Sensibility.*—The sense of touch deserves to be regarded as distinct from the general sense of *feeling*, which, with the exception of those of sight, hearing, smelling, and taste, refers to every sensation experienced in any part of the body, either from internal or external impressions, and upon which principally the physical sensibility depends. We do not mean that when the nervous sensibility in general is great, there will often be found deficiency in the organs of sight, hearing, &c.; but that what is well termed *sensibility*, both physical and mental, depends principally upon the organs of feeling. Now the great object with respect to these is, not to rouse them to irritability, by direct or excessive excitement; or to produce that irritability by methods which cannot be unattended with essential injury to the bodily health, such as over-exertion of mind, want of air and exercise, excessive warmth, &c.; but, on the contrary, to bring the system into, and to preserve it in, that state in which the simple natural pleasures of feeling (the pleasures of health, of activity, &c.) are enjoyed, and in which there shall be no unnatural tendency to the pains of this sense. How great a share these have in producing the mental pains, may be understood by the remarks on this sense in *Mental Philosophy*, Div. II. And on the subject of this section, we wish to refer the reader to *Moral Education* III. 10. 11. 12.

The general law of the *sensible* pleasures and pains is, that by simple repetition they lose their vividness, and their effect upon the mind; and the same is the case with the mere passive *mental* feelings. Yet it is of great importance to be borne in mind, in early education, and in the individual's self-culture, that where any part of the system of feeling is unduly called into exercise, it increases the irritability of the whole; that the physical powerfully acts upon the mental sensibility, and this in turn upon the physical sensibility; that whatever increases the pleasures of sensation beyond their natural state, must also increase the susceptibility of the sensible pains; and that the influence of these upon the happiness, (where they arise from, or are accompanied by, an excessive irritability of the nervous system,) far exceeds that of the sensible pleasures arising from such excessive excitement of body or of mind.

One grand object of the early period of education should

be, to bring the physical system into its due state of health, vigour, and activity. If this be successfully pursued, all is done which is requisite for the proper regulation of the physical sensibility. All the means which we have heretofore suggested, if employed judiciously and steadily, have the direct tendency to give the nervous system its due tone; to make sensations have their proper influence in the intellectual system, and to keep them from having too great influence in the system of internal feeling. On the one hand, these means will tend to correct that extreme nervous irritability which might indeed be employed successfully to produce a rapid and premature development of the faculties and affections, but which cannot be called much into play without sapping the foundation of the health of body and of mind; and, on the other, they will supply the best physical prevention of the formation of that morbid sensibility which so continually fixes the mind upon its own feelings, which implants selfishness in its most refined, perhaps, but most ruinous forms; and which seeks for gratification, or at least relief, in that unnatural excitement which only feeds the corroding irritability of the system, and must by degrees destroy the capacity of enjoyment, and plunge in perhaps irretrievable calamities. The early and external means for the cure or prevention of excessive sensibility, must however be supported by internal aids. A disposition to active exertion,—a love of order and regularity, (which we deem of incalculable importance,)—a taste for mental employment not exciting to the mind, but engaging its attention, and calling into play and strengthening its various powers, in their due measure and degrees,—a disposition which will turn the sensibility which exalts into the channel of benevolence and piety,—fortitude with respect to personal pains,—patience with respect to personal privations,—and the habit of self-control early checking or preventing that wild hankering after mere pleasure which never yet did any thing but harm, afterwards called into exercise, and supported by reason and religion, to prevent every sensual gratification which prudence and duty forbid,—these cannot fail of being attended with the most beneficial effects on the health and happiness: they will conduct the youth to the maturity and vigour of his bodily powers, and of intellect and affection: they will enable him and prompt him to act well his part in life with usefulness to others, and with honour and comfort to himself: and we need not say that they will serve as a noble foundation for religious excellence.

The following passage contains a picture of "that morbid sensibility which renders existence in many instances an almost uninterrupted series of painful sensations," which should make those concerned in education do what they can to prevent such dreadful evils. It is true it is an extreme case; but those who have had occasion to observe the appearances of morbid sensibility in less extreme and too common states, will perceive, that, in their degree, the features of the picture belong also to them. "That the dropping of a hair-pin on the floor should make a person start from her seat, and fix her in a preternatural posture, by occasioning preternatural fixed contractions of the muscles, or agitate her by contractions and relaxations equally preternatural, till she sinks into insensibility, from which she awakes into vehement delirium, is hardly credible to those who are conversant only with the healthy, and the sorts of sickness to which the robust are subject. On comparing an individual liable to these sad varieties of being, to the engineer who stands unmoved amid the thunder of a battery; to the seaman who maintains his footing upon the deck, or ropes of his vessel reeling under the shock of the elements; or to the

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The Indian who exhibits the signs, and probably feels the throb, of intense delight, while the flames are preying upon his flesh; how astonishing do we find the range in human susceptibility to the effect of the powers by which we are surrounded! how important is it to consider the causes of the difference, if on the one hand we should have as much reason to suspect that resistance to pain may be united in the highest degree to capability of pleasure, as we have, on the other, to be persuaded that those who have become in so high a degree sensitive, are nearly lost to all but painful emotions; and that if their organs are like wax in being impressed by external appulses, they too often resemble adamant in retaining what impressions they may receive." Beddoes, as quoted by Stock, p. 252.

Insanity, melancholy, epilepsy, palsy, and a whole train of evils, are the attendants upon an undue, excessive, and long continued excitement of the nervous sensibility; and it should be one leading object of education, among females in particular, so to direct their employments, their amusements, their diet and temperature, their waking and their sleeping hours, that their constitution may be hardened, their bodies and minds invigorated, and the best chance given them for meeting the unavoidable evils of life, so that these may promote their moral improvement, without inflicting upon them unnecessary sufferings, or destroying their powers of usefulness. With this view, it may be laid down as a maxim in education, that whatever strongly excites the sensibility, without connecting it with active exertion, whatever, in short, increases the disposition to passive pleasure, is, and must be, injurious,—injurious to the health of the mind, and alike injurious to the health of the body. To make such sickly sensibility the subject of approbation is folly in the extreme.

How the sensibility, in its natural state, should be turned into the channel of benevolence, we have endeavoured to shew in *MORAL Education*; and the reader will find some judicious observations on the same topic in Miss More's *Strictures*. With respect to girls, what in general is most wanting is, to check their sensibility, or at least to give it its proper direction. With respect to boys, it may sometimes be necessary to excite their *mental* sensibility; but in general, where proper pains have been taken early in life, the benevolent affections will have sufficient vividness and vigour; and at any rate they should never be enlivened by stimulating the sensibility of the nervous system. A boy should, if possible, be kept from the feeling that he has nerves; if we find his affections and intellect strong and vigorous, that is all we can wish for.

**X. Purity.**—The work of education has, indeed, an extensive scope; and no department of it can be neglected without injury to the rest. Physical education is of the first importance in the earliest periods; but if it be even then made an exclusive object, the consequences must be highly injurious. An unrestrained mind in a vigorous body, as we have already observed, will be the most likely to sink into the lowest moral depravity, and eventually to destroy, by this means, the object to which so much care and exertion had been devoted. Without attaching any importance to the number *seven*, as pretending to set limits, which, in a great variety of instances, must be merely arbitrary, the interval between birth and manhood may be conveniently divided into three periods, of seven years in each. During the first (unless the imagination of a child has been allowed to gain an excessive preponderance, and the elements of desire have risen to an enormous height) there must be uncommon impurity in the language or actions of those around

them, if the conceptions or desires have, in any degree, a sexual complexion. But during the second, (more especially if children associate much with others *older* than themselves, who are not under the restraints either of delicacy or decency,) it is an unhappy fact, that long before there can, in the order of nature, be any proper sexual desires, there is not unfrequently a degree of indecency in language and manners, against which the parent, who is anxious for the moral welfare of his children, should most sedulously guard. We have known this to be the case, even where boys have been brought up at home, having been allowed, however, to mix with those who themselves had little moral control; and we see reason to think it particularly the case at those schools where boys of the second period are allowed a free intercourse with those of the third. Hence we admire the plan which appears to be gaining ground, of schools for boys from six to twelve. If they are thoroughly well regulated, under the superintendance of able persons, and they give especial care to the prevention of impurity in language, &c., the most beneficial ends may be answered. Perhaps even a progress in the languages might, upon an average, be made in such seminaries as satisfactory as at schools upon the usual plan; the rudiments of other valuable branches of knowledge would be gained more effectually; and, above all, the moral culture of the mind might be carried on with much greater success. As far as our experience goes, it is more difficult to restrain the impure language of young boys, whose minds have received an early taint, than of older ones, unless, indeed, the disease has taken a deep and alarming root. In the former case it is extremely difficult to instil that sense of impropriety, which, where there is any moral feeling, may be produced in this connection, soon after the age of puberty. Some may think that great care on this subject is a refinement of squeamish delicacy, and not a necessary precaution of moral purity; we are however satisfied that such will not be the opinion of those who have studied the laws of the human mind, or who have observed the power of words over the conceptions of the imagination and the excitement and the direction of the desires. That power is beyond all calculation, and often beyond all control. The casual imagery of the fancy will pass away, and unless the mind intentionally dwells upon it, cherishes it, and endeavours to recall it, it may even leave no vestige to bring it back again into view; the mere corporal feeling, unless unhappily inflamed by external sources of impurity, may easily be brought into subjection. But when words have been much or long associated with such trains of conceptions or feelings, they will, in various ways, contribute to excite and to strengthen them, and the consequence will often be that purity will be lost, and that the moral, mental, and physical system, will sustain shocks from which they cannot recover.

It is one most injurious effect of that excessive reserve which parents often think necessary on these subjects, that their children are left without any definite knowledge of the mischief which the language of indecency will inevitably produce. Let the parent acquire his child's full confidence, and let him, with no other end in view, than his moral welfare, early give him judicious warning, and repeat this as often as he may think necessary to revive the impression, and the best effect will follow.

We presume not to offer much advice on this subject to *mothers*. A mother possessed of genuine delicacy of mind will not need it; and to others we could be of no service. A daughter grows up so much more under her mother's

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eye, than a son can do, and there is, we doubt not, among all but the most abandoned of the female sex, so much more of that "decent *personal reserve* which is the foundation of true delicacy of character," that we hope it can require but common judgment and common care to preserve her purity of mind. A mother who knows, however, the moral dangers of the female sex, even where the general laws of chastity are not violated, will be on her guard in observing every possibility of exposure to them; she will guard the plant of modesty with assiduous care, and will be watchful to preserve it from the noxious influence of the indelicacy of rude ignorance or of impurity. We have reason to think that mothers sometimes allow their daughters a more unrestrained intercourse with servants, or with companions of suspicious delicacy, than prudence can authorize. They never should be exposed to circumstances which may lead them to offend against "decent personal reserve." How much the present too common modes of dress will lessen that feeling, every considerate mother must perceive. What those moral dangers are to which we referred, beyond those of impure language, and how fatally they have been experienced, we think a father anxious for the welfare of his daughter, will take proper means of acquainting her to whose fostering care they are to owe their safety. Beyond what we have suggested, we can merely add, that the books which lie in the way of girls of the second period, not only should not be of that kind which must cherish a sickly sensibility, but should be free from every thing at which genuine modesty would blush. And if a visitor should, in their presence, bring forward such ideas, however clothed in the language of elegance, or refined double entendre, he ought to be excluded from their society. That a father should ever do so seems impossible: we wish it were.

But the delicacy we wish to see, "is something nobler than innocence." It is not the delicacy of ignorance, but the purity of imagination and desire. And we are satisfied that this is, in some instances, best preserved by a knowledge of the simple truth. "The ridiculous falsities which are told to children from mistaken notions of modesty, tend very much to inflame their imaginations, and set their little minds to work respecting subjects which Nature never intended they should think of, till the body arrived at some degree of maturity. Children very early see cats with kittens, birds with their young, &c. Why then are they not to be told, that their mothers carry and nourish them in the same way? As there would then be no appearance of mystery, they would never think of the subject more. Truth may always be told to children, if it be told gravely; but it is the immodesty of affected modesty that does all the mischief; and this smoke heats the imagination by vainly endeavouring to obscure certain objects." *Parent's Friend*, vol. i.

Thus far we presume to suppose we have not offended against our own principle. We have hitherto written for parents indiscriminately; but what follows is designed for the eye of the father; and we must here be allowed a little more minuteness.

We do not doubt that the due regulation of the sexual desires is, on the whole, the greatest difficulty in education. The danger of doing too much is, in some cases, almost as great as the danger of doing too little. But the circumstances of the times, including social intercourse, newspaper communications, &c. are such, that nothing, we think, but the blindness of ignorance, or the carelessness of vice, or the excessive caution of unenlightened or indolent timidity, can hesitate in endeavouring to communicate such

impressions respecting the nature and consequences of an illicit or unnatural indulgence of those desires, as may operate altogether to prevent, or most materially to check them.

How early such communications should be made, is a matter of extreme difficulty. We recollect hearing a father say, that he had succeeded in producing in the mind of his son, before the age of puberty, such a detestation of the vice we have more particularly in view, that he felt a full confidence as to his moral restraint. In that process we have as yet had no experience; but we are inclined to suppose, that more will be effectually done by giving only general, though perfectly distinct, cautions, respecting language and actions connected with this subject, and by leaving the more impressive representations till the period when the desires will stand most in need of restraint.

Before the age of twelve, a father will often be able to perceive, in a well-educated boy, the indications of decided moral principle; by which we understand the real and actuating desire to do right, and to avoid every thing wrong. When besides this he has reason to have confidence in his son's purity of mind, (we still mean of imagination and desire,) and also in his prudence, we think a simple judicious communication respecting the delicate structure, and the object of the male organs, would be attended with important advantages. This would lead to a few plain, but impressive statements, respecting the highly injurious and often fatal consequences of the abuse of them; and the necessity of strictly avoiding every thing, in word or action, which might lead to such abuse. With these representations, the father who has successfully cultivated the principles of religion in his son's mind, would add such as would connect with every kind and degree of impurity, the idea of its offending his omniscient heavenly parent. If it have previously been his object to communicate interesting information respecting the structure and functions of the human frame, such a communication as we have mentioned will have no appearance of formality; and it may be introduced by a natural digression from some other connected topic. Some suggestions as to the mode of accomplishing it may be obtained from Dr. Beddoes's fourth Essay; but we would make it a much more simple business. It will require no more knowledge of anatomy, than what any judicious well-informed father may easily gain from different articles of this work, or the common works on the subject; though if he had an injection of the vessels preparing and conveying the seminal fluid, this aided by plates shewing the *internal* structure of the urinary and seminal organs, could not fail to produce a salutary fear of injuring that which simple inspection would prove to be so complex and so delicate.

We need not say, that whatever determination he adopt on this difficult point, he must do his best to keep off from his son those impressions, (from books, pictures, conversation, &c.) which may tend to give a premature excitement to his desires, or to feed them when they spring up in the course of nature; and as he cannot altogether succeed in this, he will endeavour to render them powerless, by such representations as may make them rather shunned than fostered. A parent with any just sense of duty, cannot fail to avoid himself communicating such impressions, or permitting them to be made under his own eye; "Nil dictu sedura visuque hæc limina tangat Istra quæ puer est," should be inscribed in his memory, and made his invariable principle. It is indeed a noble one; and alike important.

With the same object in view, he will sedulously (yet without any formal precepts,) endeavour to prevent all breaches

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breaches of that decent personal reserve of which we have spoken; for instance, at the times of bathing, washing, attending to the calls of nature, &c. We do not want to see affected squeamishness, often hiding real indecency; but genuine delicacy and purity. And he will also observe, (with this specific object in view, *viz.* to keep the sexual desires as near as possible within the limits of nature respecting time and strength,) those rules which common prudence and experience suggest, respecting simple diet, active exercise, early rising, &c.

But we will suppose a case in no degree uncommon; that no communication has been made to a youth respecting the evil we have already alluded to, and that his father, or a parental friend, see reason to believe, that all his *indirect* caution has been ineffectual, and that the deleterious practice has been begun which will gradually impair his bodily and mental powers; and, if not prevented in time, will plunge him into irretrievable evils. Can there be any hesitation what course to pursue? Can there, then, be a doubt as to the necessity of opening his eyes to his situation? It must be done with prudence; but we know it may be done with success; and we know, too, that the result may be earnest affectionate gratitude for the communication, and heartfelt satisfaction at having been the means of preserving a fellow creature from the most serious calamities.

Whether the communication should be in conversation or by letter, must be decided by the circumstances of the case; we have known each tried. On the whole we should prefer opening the subject by conversation. It will then be more easy to perceive whether the caution had been necessary, and to what degree. After some interval, a paper might be put into the hands of the youth, containing a brief, but distinct, and impressive statement of the dreadful consequences of the practice; and some simple cautions to aid in checking the tendencies of the mind to it. If this produced its proper effect, it would scarcely be necessary, for a considerable interval, to revert to the subject; but then it might, at least, be expedient. It is, however, by no means desirable to bring it frequently forwards; for though it may be treated as a moral disease, yet there must be a feeling of delicacy (or perhaps we should say of shame) attending it, which could not be worn off without serious injury; add to which, the efficacy of the representations made would lessen by too much repetition. Those external indications which furnished the first ground for apprehension, must, however, be the guide in determining the subsequent steps. The difficulty is in the commencement. And we should add, that in the first conversation every means should be employed, to prevent all conversation on the subject with others; it should be absolutely confined to the individual and his friend.

The parent or tutor may take every preventive caution, (exclusive of direct communication,) may do every thing that enlightened prudence would suggest to preserve strict personal reserve, and keep off the contagion of evil example; and all this completely, and in itself considered successfully; and yet without preventing the evil. Many instances have been known of its commencement without any communication with others, and by circumstances in some sense accidental. We are fully satisfied, taking every thing into account, that it would be best to *forewarn* every boy who possessed a tolerable share of good sense and moral susceptibility. Numerous instances have occurred, in which this practice has been begun and persevered in, till the mischief was almost, if not altogether, irretrievable, without the individual's having been fully sensible of the criminality, and

but little of the most injurious consequences, of "this species of slow suicide."

For the mode of commencing the subject after there were decided grounds of apprehension, we can give no specific directions. We can only say, that it must be done at a suitable time; when the mind seems open; when nothing has occurred to excite suspicion as to the motives; and with that cautious reserve which may give an insight into the real state of the case. Then is a time to give a faithful representation of consequences, &c. A paper for the purpose already suggested, might be of some such nature as the following, which may assist in the first stages also.

We would begin by mentioning, (without of course the slightest personal allusion,) such cases as had occurred to our own knowledge, where loss of sight, total loss of mental and bodily health, and premature death, had followed the continuance of it; and where extremely debilitating involuntary emissions had succeeded the habitual practice of it, even where it had been abandoned. We would then select such compressed statements from books of authority, (and we have seen Tissot often referred to, and in Dr. Beddoes's fourth Essay will be found a striking case, which will urge every considerate parent to early communication,) respecting the common effects of this waste of a fluid designed to answer such important ends in the animal economy, and the early and excessive loss of which must weaken the whole nervous and digestive system, impair the faculties of the mind, and surrender the wretched victim of sensuality to the miseries, infirmities, and decrepitude, of extreme yet infirm old age. We would inform him that it would subject him to convulsions, epileptic fits, palsy, insanity, impotency, tabes dorsalis, corporal emaciation and decay, and partial or even total blindness or deafness; and that where the progress to these calamities had been checked in time, the mental and bodily faculties are usually so injured by any long continuance of it, as to become incapable of any valuable exertion. We would farther tell him, that the bare statement of the natural and necessary effect of this destructive practice, was sufficient to shew the will of God respecting it, even if it do not appear to be expressly forbidden in the scriptures. That it is included in strong expressions of a more general nature, (such as Rom. xiii. 12—14. 1 Cor. iii. 16, 17. 2 Cor. vii. 1. Gal. v. 19—21. 1 Pet. ii. 11., and especially 1 Cor. vi. 9—10.) there can be no doubt; and at any rate that God has forbidden it by the usual course of providence. That its moral effects in destroying the purity of the mind, in swallowing up its best affections, and perverting its sensibilities into this depraved channel, are among its most injurious consequences; and that they are what render it so peculiarly difficult to eradicate the evil. That in proportion as the habit strengthens, the difficulty of breaking it of course increases; and that while the tendency of the feelings to this point increases, the vigour of the mind to effect the conquest of the habit gradually lessens. We would tell him, what we remember a medical professor said, that whatever might be said in newspapers respecting the power of medicine in such cases, nothing could be done without absolute self-control, and that no medicines whatever could retrieve the mischiefs which the want of it had caused. And that the longer the practice was continued, the greater would be the bodily and mental evils it would inevitably occasion. We would then advise him to avoid all situations in which he found his propensities excited, and especially, as far as possible, all in which they had been gratified; to check the thoughts and images which excited them; to shun those associates,

or at least that conversation, and those books, which have the same effect; to avoid all stimulating food and liquor; to sleep cool on a hard bed; to rise early, and at once; and to go to bed when likely to fall asleep at once; to let his mind be constantly occupied, though not exerted to excess; and to let his bodily powers be actively employed, every day, to a degree which will make a hard bed the place of sound repose. Above all, we would urge him to impress his mind, (at times when the mere thought of it would not do him harm,) with a feeling of horror at the practice; to dwell upon its sinfulness and most injurious effects; and to cultivate, by every possible means, an habitual sense of the constant presence of a holy and heart-searching God, and a lively conviction of the awful effects of his displeasure.

When entering into the world, where temptations of a different nature will necessarily occur, we would, before his leaving the roof of the parent, then enter into other branches of moral restraint. On this point, however, we have had an opportunity of saying enough already; see *Moral Philosophy*, II. 1. 2. 3. to which we refer the reader.

At the close of *Moral Education*, after a reference to the suggestions we have now brought forwards, we expressed our intention to introduce in this article "a comparative view of the advantages and disadvantages of public and private education." Since this series was commenced, we have, at different times, paid some attention to the subject; but still without the ability to draw up such a view as would prove satisfactory to the reader or to ourselves. We shall once more defer it, and hope to offer it under the head of *SCHOOLS*.

Since the former part of this article was sent to the press, we have had an opportunity of hearing Syer's Treatise on the Management of Infants strongly recommended by a professional man, as a truly excellent work; and we think it our duty to mention it for the benefit of our readers. On the subject of this last division, some striking observations will be found in a singular work, entitled "The first Lines of a System of Education, according to Philosophical Principles."

**PHYSICIAN**, a person who professes the art of preventing and curing diseases. At present the appellation is usually limited to persons who possess the degree of doctor, or bachelor of medicine, and who do not practise chirurgical operations; since custom has introduced this division into medical practice.

The profession of curing diseases, however, is very far from being confined to these two classes, physicians and surgeons: for, in modern times, both these classes are greatly outnumbered by the apothecaries, or dispensers of medicines, who have, in the course of years, gradually become medical advisers, and have undertaken both the counsel and management of the sick, and the manipulation of remedies. Or perhaps the division may have originated by an opposite progression, in proportion as men of liberal education and enlarged views took up the investigation of the human constitution, and by carrying the principles of science to the mere art, at once augmented the utility of the profession, and gave dignity to the pursuit. The acquirements which are necessary to form the accomplished physician, are, indeed, not comprised within a small compass, and are therefore only to be attained by a careful cultivation of the understanding for a series of years; for without the preparatory and collateral information, the mere medicinal knowledge will, in general, lead but to a blind routine in the steps of the master, and to a limited and often erroneous application of a few unvarying precepts. A

curfory view of the qualifications of the medical character may perhaps, therefore, not be out of place here; the history of the progress of medical opinions and improvements having been already detailed. See *MEDICINE, History of*.

All the works of nature are so intimately connected, that no one part of them can be well understood, by considering and studying it separately. In order, therefore, to be qualified for the practice of physic, a variety of branches of knowledge, seemingly little connected, are nevertheless necessary. The early studies of an individual destined to the profession, should be of that liberal nature which tend to enlarge the views, and to cultivate the reasoning faculty, and a talent for observation; for that quickness of perception and readiness of resource so necessary in the emergencies which often present themselves in practice, can only be perfected by a clear and methodical arrangement of ideas and an extensive knowledge.

Independently of the improvement of the faculties and the refinement of taste, which are derived from the study of the ancient languages, the sources of a physician's information must be very limited, if he is not master at least of the Latin tongue, which has been the universal language of the learned in Europe for so many ages, and serves as the medium of communication between all nations on the subjects of science. The labours of the ablest medical philosophers of Italy, Germany, and France, can only be participated through the medium of that language. The same actual necessity may not exist for a knowledge of the Greek language: but an acquaintance with that copious, expressive, and harmonious tongue, in which some of the oldest, and some of our best authors have written, particularly Hippocrates, the father and founder of medicine, could scarcely be dispensed with, even if almost all the medical terms of art were not derived from it. Ignorance of this language must therefore impede the progress of the medical inquirer; nor can it be deemed becoming a physician to be in the daily use of terms, to the original of which he is a stranger. The progress of medicine and the collateral sciences in France, which during the last half century has been recorded in the vernacular language, renders a knowledge of that tongue now indispensable; and an acquaintance with the German is daily becoming the key to much valuable knowledge.

Thus prepared with the means and instruments for acquiring information, the physician must deem a knowledge of the following sciences essential to his profession. The necessity of a previous knowledge of *anatomy*, or of the structure of the human frame, to the practitioner of medicine is obvious. That very minute acquaintance, however, with the ramifications of every arterial branch, and with the course and insertion of every muscle, so necessary to the surgeon, who is employed to divide and remove different parts by the knife, is scarcely requisite to be retained in the recollection of the physician. To him a correct knowledge of the situation, appearance, structure, and connection of the more important organs is, however, not to be dispensed with. The best anatomists, like the best mechanists of watches and other machines, will be best able to replace or remove what is morbid or deranged, *i. e.* will be necessarily the best *operating surgeons*; but it is obvious that the person best acquainted with the structure of parts, not to be approached by mechanical means, is not necessarily the greatest adept in ascertaining their diseases, which are learnt from a knowledge of *symptoms* only, nor of curing them by the indirect operation of medicines.

For the purpose of ascertaining the seat and nature of the diseases

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diseases of parts not under the view of the eye, nor within the reach of the hand, the two branches *physiology* and *pathology* are requisite: and these, especially the first, comprehend various other branches of knowledge which might appear unconnected with them.

Physiology comprises the doctrine of all the functions of the animal body in its healthy state; as well as of the nature and composition of the fluids, their production, uses, and discharges. For the proper comprehension of these matters, the whole range of *natural philosophy* is indispensably necessary. "When you inquire into this subject," says Dr. Gregory, "you find the human body a machine, constructed upon the most exact mechanical principles; in order, then, to understand its movements, you must be well acquainted with the principles of *mechanics*. Considering the human body in another view, you find fluids of different kinds circulating through tubes of various diameters; the laws of their motions, therefore, cannot be understood without a knowledge of *hydraulics*. The eye appears to be an admirable optical machine; and of course the phenomena of vision cannot be explained without a knowledge of the principles of *optics*. As the human body is surrounded with an elastic fluid, the air, subject to various changes in respect of gravity, heat, moisture, and other qualities which have great influence on the constitution, it is proper to be acquainted with the nature and properties of this fluid, the knowledge of which constitutes the science of *pneumatics*. It were easy to bring many more examples to shew how necessary a knowledge of the various branches of natural philosophy is to the right understanding of the animal economy." See Dr. John Gregory's Lectures on the Duties and Qualification of a Physician, p. 73.

But there are many other phenomena of the animal economy, which are not explicable on the principles of mechanical philosophy. Various changes are induced upon the fluids, which chemical science can alone explain. The production of different fluids from one source, their qualities and nature, are not indeed as yet fully ascertained; but chemical analysis affords the only source of investigation. It is, therefore, necessary to be acquainted with the chemical history of our fluids; and still more requisite to know the chemical qualities of numerous substances which are taken into the human body as food, drink, medicine, and poison. The necessity of a knowledge of *chemistry*, therefore, previous to the study of the practice of physic, is obvious.

Yet the most accurate knowledge of anatomy, of mechanical philosophy and chemistry combined, will be insufficient to explain all the phenomena of the animal economy. The animal machine differs in many important circumstances from an inanimate one. An internal principle directs and influences most of the operations of the body, by a set of laws totally distinct from, and independent of, any principles of mechanics or chemistry hitherto known. It possesses the power of motion within itself, and even of modifying and resisting the operation of ordinary chemical agents: it has likewise the power of removing its own disorders, and of rectifying many deviations from its natural state; as in the case of fractured bones, of the incarnation of wounds, of the enlargement of one organ when another is destroyed, &c. It must be obvious, therefore, notwithstanding the many attempts that have been made to explain the phenomena of the animal body upon mechanical and chemical principles alone, that such a doctrine must be altogether imperfect.

A new and interesting investigation, therefore, presents itself to the physiologist, and one of the most intricate and difficult pursuit; namely, an inquiry into the laws of the

*nervous system*, or of that faculty of living beings which has been called the *vital principle*, *sensorial power*, *nervous energy*, &c. (See EXCITABILITY, and LIFE.) On this power depend all the faculties of sensation and motion; the phenomena of the circulation of the blood from the moving powers of the heart and arteries; those of respiration, and the changes which that function produces on the blood, on the brain and organs of sense, and on the temperature of the body; and, consequently, the phenomena of digestion, absorption, nutrition, secretion, (as of bile, saliva, tears, urine, &c.), and excretion (as of the intestinal fæces, of perspiration, mucus, &c.), which are the result of the circulation of the blood. In order to illustrate the nature of these functions of the human body, a knowledge of the *comparative anatomy* of other animals is requisite. Many important discoveries in the animal economy have originated in experiments first made upon brutes, which could not have been made upon the human subject; for example, the experiments relating to the circulation of the blood, respiration, muscular motion, the sensibility and irritability of different parts of the body, and the effects of various medicines.

It belongs, moreover, to physiology to trace the diversity of the human constitution in different individuals, circumstances, and climates, arising from age, sex, manner of living, and original temperaments or habits of body; inasmuch as diseases are much influenced, as well as the operation of remedies, by these varieties. For the same reason, it is also requisite to inquire into the laws relating to the mutual influence of the mind and body upon each other. This leads to an extensive and interesting subject, the history of the faculties of the human mind; which, if we are not on our guard, is apt to carry us insensibly into a labyrinth of metaphysics. How important, however, the study of these laws is to the physician, may be demonstrated in considering the power of habit, the effects of enthusiasm, the force of the imagination, and the influence of the principle of imitation, on the functions and diseases of the body. See HABIT; IMAGINATION, *Influence of, on the Corporeal Frame*; and IMITATION, *Principle of, in Medicine*.

All these branches of knowledge, however, may be considered as preliminary to the great object of the physician, which is the discrimination and cure of diseases. When he is well acquainted with the nature and functions of the living body in its healthy state, he will be prepared to investigate them in a state of disease. *Pathology*, which delivers the general doctrine of the causes, symptoms, and effects of diseases, is obviously built upon *physiology*. The mode in which the seat and nature of diseases are to be ascertained from their symptoms and progress, and the indications to be deduced from them, have been detailed at length under the proper head. (See DISEASE.) The general doctrines to be observed in the cure of diseases, and the general nature of the remedies to be employed, constitute the *therapeia*, or *therapeutics*; which comprises a knowledge of the *Materia Medica*, or of the substances, natural and factitious, that are administered to the sick, and of their qualities and effects. In this branch of medicine, the necessity of a knowledge of *chemistry* is again apparent, since many of the most active and valuable agents are the products of this art; and the science of *botany*, so far as it facilitates the knowledge of the plants which are used in diet or medicine, is likewise subservient to therapeutics.

Thus copiously stored with all the information above alluded to, the physician is prepared to acquire experience, by observing the various symptoms of diseases, and the operations of medicines, during his attendance on the sick: and let it be remembered, that it is only upon such a founda-

a foundation that real *experience* can be built. Experience does not consist in *seeing* a great number of diseases: for if it were so, the best physician in the world would be an old nurse in a large hospital, who sees the daily and hourly progress of every species of malady. Yet how contracted the views, how limited the resources of such a person! how mechanical and unvarying are the few rules of practice which are thus acquired! Yet such is, in fact, the sum of the *experience* which a whole life of practice affords to those who presume to enter the profession of medicine, without that preliminary education, which alone fits the mind for *observation*, the only foundation of true experience. A person may be taught many of the practical arts of life, to a certain extent, without any knowledge of their principles. He may learn to navigate a ship, in a certain course, with little knowledge of the principles of navigation; or he may make a dial without any acquaintance with astronomy, or spherical trigonometry: so he may be taught, behind the counter of an apothecary's shop, half a dozen apozems for the cure of a cough or a diarrhœa. But order such a navigator to steer a new course, or such a diallist to take a new aspect; and from a total deficiency in the *first principles* of their respective arts, they are altogether unable to succeed. Still more difficult is it to be successful in the cure of diseases, without a knowledge of first principles; because the circumstances of diseases are perpetually varying; and the same symptom, a cough or diarrhœa for instance, are indicative of very different states of disease, and will be materially injured in one instance by the very remedy which proved curative in another. (See COUGH.) Throughout the practice of medicine, indeed, a resort to general principles is perpetually necessary, since no two cases of disease are exactly similar. Many diseases, it is true, are obvious in their causes, appearances, and treatment, and, if not actually mismanaged, have a natural tendency to terminate in health; but on the other hand, many serious maladies assume at first a common form, and it requires no little sagacity to trace them in the bud, and no little knowledge to obviate their fatal consequences.

It is not, however, enough to possess knowledge; but the mind should be able at once to possess in review the knowledge which it retains, and should be ready and active in its application. It is often necessary to adopt at once a plan, and to pursue it with active decision: it is necessary to weigh contending difficulties, and at once to seize the path where the fewest or least important appear, or where the inconveniences are counterbalanced by the advantages. It is not always easy for the observers to estimate the value of such decision in the physician; for this rapidity is often equally the offspring of ignorance: because no difficulty can be experienced by those who are not able to anticipate consequences; and doubt, the consequence of different resources contending for superior eligibility, can scarcely be felt by those who have no plan at all. Physicians are called on, in general, to act with this prompt decision; and to hesitate is usually accounted a mark of ignorance. A man must have merited the confidence of the world before he can claim time for consideration, and his reputation must be firmly established, before he can own himself at a loss. This necessary readiness of resource is partly owing to habit and experience, but principally to a methodical arrangement and clear distinct views of the knowledge treasured in the mind. The able and experienced physician, who can at once comprehend the object to be attained, will, at the same moment, perceive the various methods by which it can be effected, and he has only to chuse the most convenient and the best adapted to the habit or idiosyncrasy

of his patient. In his progress new views will probably open, and the soundest judgment is shewn in steering between the opposite extremes, of varying the plan according to the variety of symptoms, or obstinately persisting in it, notwithstanding every change of appearances. The first is pleasing to common observers, as it shews a diligent attention; but it is a proof of weakness and indecision. The last, perhaps the most venial error, is the effect of too great confidence; and, unless accompanied with extensive knowledge which dictated the first opinion, and an acute sagacity in discerning the effects of medicines, is scarcely less injurious.

It seems obvious, then, that a complicated art, like that of medicine, can only be acquired by the union of extensive information, with diligent observation, and that much evil is likely to ensue where it is practised without these qualifications. Absurd as is the notion of universal remedies, or of any given remedy for any one disease nominally the same, the extent of quackery seems, however, to be increasing, partly from the revenue which government derives from it, but very much also from the acknowledged imperfection of the medical art in the hands of so many half-qualified practitioners. To conclude, however, in the words of that able and estimable physician before quoted; "On the whole, it will appear, that a physician, who understands the principles of his profession, who has an extensive acquaintance with every branch of natural knowledge connected with it, who properly applies his knowledge, and who has genius and attention equal to others, must have a great advantage, as a practical physician, over one who is ignorant of the principles of medicine, and of the sciences connected with it. Genius and sense are, indeed, the peculiar gift of heaven, and cannot be acquired by the most extensive learning, or the greatest efforts of industry. But with these assistances, genius and sense are capable of the highest improvements." Gregory's Lectures, before quoted, p. 87. See also Parr's London Medical Dictionary, art. *Medicine*; and Percival's Medical Ethics.

PHYSICIANS, *Dogmatical*, called also *rational*, among the ancients, were those who endeavoured to reduce their knowledge of diseases to certain principles. The *dogmatic* physicians were in opposition to the *empirics*. See *EMPIRIC*.

PHYSICIANS, *Empirical*, properly signify those who rely upon experience, and are directed by it in practice. An ancient sect of this appellation was opposed to the *dogmatic* or *rational* sect; and the principles of both are admirably detailed and criticised by the elegant Celsus. De Medicinâ, Praef. See *EMPIRIC*.

PHYSICIANS, *Methodical*, a sect of physicians of Rome, who refused to adopt the doctrines either of the dogmatic or empiric sect. See *METHODISTS*, in *Medical History*.

PHYSICIANS, *Galenic*, a distinction assumed by those physicians after the revival of learning, who prescribed only vegetable medicines, and their preparations. They stood in opposition to the *chemical* or *spagirical* physicians, who employed the preparations of metals and minerals procured by chemistry. See *GALENICAL*.

PHYSICO-MATHEMATICS, includes those branches of physic, which, uniting observation and experiment to mathematical calculation, undertake to explain the phenomena of nature. See *MIXED MATHEMATICS*.

PHYSICS, *PHYSICA*, φυσικη, derived from φυσικη, nature, sometimes also called *physiology*, and *natural philosophy*, is the doctrine of natural bodies, their phenomena, causes, and effects, with their various affections, motions, operations, &c.

## PHYSICS.

Mr. Locke would likewise have God, angels, and spirits, comprehended under physics; but these are more usually referred to metaphysics.

The immediate and proper objects of physics, are body, space, and motion.

The origin of physics is referred by the Greeks to the Barbarians, *viz.* the Brachmans, Magi, and the Hebrew and Egyptian priests.

From thence it was derived to the Greek sages or sopheri, particularly to Thales, who is said to have first professed the study of the phenomena of nature in Greece. He supposed water to be the general principle from which all material things are formed, and into which they are resolved: he particularly noticed the properties of the magnet, which had been before observed to attract iron, as well as the effect of friction in exciting the electricity of amber; and to both of these substances he attributed a certain degree of animation, which he considered as the only original source of any kind of motion. (See THALES.) Anaximander (see his biographical article) appears to have directed some attention to meteorology; he derived the winds from the rarefaction of the air produced by the operation of heat; and he attributed thunder and lightning to the violent explosion or bursting of the clouds, which he seems to have considered as bags, filled with a mixture of wind and water. The same erroneous notion was entertained by Anaximenes (see ANAXIMENES), who compared the light attending the explosion, to that which is often exhibited by the sea, when struck with an oar. Pythagoras is said to have reasoned on physical effects in a manner too mathematical and visionary to entitle him to be ranked among those who have investigated the minute operations of nature. (See PYTHAGORAS.) For the opinions of Anaxagoras and Democritus, see their respective articles. Thales had supposed water to be the first principle of all things, and Anaximenes air. Heraclitus fixed on fire as the basis of his system, attributing to it the property of constant motion, and deriving all kinds of grosser matter from its condensation in different degrees. (See HERACLITISM.) It is observed by Bacon, in his essay on the opinions of Parmenides, that the most ancient philosophers, Empedocles, Anaxagoras, Anaximenes, Heraclitus, and Democritus, submitted their minds to things as they found them; but Plato made the world subject to ideas, which he supposed to exist independently of the human mind, and of the external world, and to compose beings of different kinds, by their union with an imperfect matter. Aristotle made even ideas, as well as other things, subservient to words; the minds of men beginning, in those times, to be occupied with idle discussions and verbal disputations, and the correct investigation of nature being wholly neglected. Plato, however, entertained some correct notions concerning the distinction of denser from rarer matter by its greater inertia; and it would be unjust to detract from the extraordinary merit of Aristotle's experimental researches, in various parts of natural philosophy, and more especially from the information contained in his works on natural history. Aristotle attributed to fire absolute levity, and to the earth gravity, considering air and water as of an intermediate nature. (See PLATO and ARISTOTLE.) For an account of the opinions of Epicurus, see EPICUREANS. The works of the ancients, though scarcely any one of their opinions and conjectures was scientifically established on sure foundations, furnish nevertheless a variety of detached facts and observations, that have either led to modern experiments and discoveries, or that have been confirmed by them. Such especially is the fact recorded by Protagorides of Cyzicum, quoted

by Athenæus, who relates, that in the time of king Antiochus, it was usual, as a luxury, to cool water by evaporation: and also the phenomenon noticed by the ancients, that water usually froze the more readily for having been boiled.

The era of the revival, or perhaps we may justly say, of the commencement of physical discoveries, was the 13th century; to which period we may refer the famous Roger Bacon; Hugo Bertius, who is said to have described the polarity of the magnetic needle, though some suppose that the description of it was contained in verses attributed to Guyot, a French poet, who lived about the year 1180; Gioja of Amalfi, who first employed the compass in navigation about the year 1260; Peter Adiger, who mentions the declination of the needle from the true meridian in a manuscript bearing date 1269 (see MAGNET); and the poet Dante, who, about the close of this century, distinguished himself by his philosophical, as well as literary works, and who has given an essay on the nature of the elements. Amongst the philosophers of later date, to whom the sciences, comprehended under the head of Physics, are indebted, we might mention Dr. Gilbert of Colchester, who flourished about the close of the 16th century, and to whose writings on magnetism and electricity we have referred under those articles. The change or variation of the declination of the needle, the discovery of which has been commonly ascribed to Gellibrand, in 1625, must have been inferred, says Dr. Young, from Gunter's observations, made in 1622, if not from those of Mair, or of some other person as early as 1612; for at this time the declination was considerably less than Burrows had found it in 1580. In the beginning of the 17th century lord Bacon acquired, by his laudable efforts to explode the incorrect modes of reasoning which had prevailed in the schools, the just character of a reformer of philosophy: but his discoveries were neither numerous nor striking. In 1620, he proposed an opinion, with respect to heat, which appears to have been then new, inferring from a variety of observations, detailed in his "Novum Organum," that it consisted in "an expansive motion, confined and reflected within a body, so as to become alternate and tremulous: having also a certain tendency to ascend." A similar opinion, respecting the vibrating nature of heat, was suggested, about the same time, by David Gorlaeus, and it was afterwards adopted by Descartes, as a part of his hypothesis, concerning the constitution of matter. (See CARTESIANISM.) In the year 1620 Cornelius Drebel invented a method of measuring the degrees of heat by a thermometer, which, in its first and imperfect state, was a very important instrument; but it was much improved at the close of the century by Dr. Hooke's discovery of the permanency of the temperature of boiling water; which afforded a correct and convenient limit to the scale on one side, as the melting of snow served for fixing a similar point on the other. The true course of the circulation of the blood was discovered by Dr. Harvey in 1628. (See CIRCULATION of the Blood.) In the middle of the 17th century the barometer was invented by Torricelli; the variation of the atmospheric pressure was discovered by Descartes; and Pascal made several experiments which led to the method of determining heights by barometrical observations. (See AIR, ATMOSPHERE, and BAROMETER.) We pass over the observations of Gesner and Aldrovandus with respect to the animal kingdom, and those a century later of the Bauhins, on the vegetable kingdom: and also of Ray and Willughby, Tournefort and Reaumur; and proceed to mention, that the latter half of the 17th century was rendered a very interesting period in the his-

tory of natural knowledge by the establishment of the philosophical societies of Europe; such were the Royal Society of London, in which Boyle, Hooke, Halley, and Newton, distinguished themselves; and the Academy of Sciences at Paris; and also, though of less extent and shorter duration, the Florentine Academy del Cimento. (See ACADEMY and SOCIETY.) In the middle of the 18th century the science of electricity was diligently cultivated by Stephen Gray, Hauksbee, Dufay, Winkler, Nollet, Muschenbroek, Franklin, Willon, Canton, Henly, &c. &c. (See ELECTRICITY.) The celebrated Linnæus, in his system of botany and zoology, has contributed in a very eminent degree towards bringing near to perfection the logic and phraseology of natural history; nor has he wholly neglected the philosophy of the science. His successors have acquired distinguished merit in these departments of science; but it would be almost endless to recount the names even of those who have most excelled: among whom we may reckon Buffon, Spallanzani, Daubenton, Geoffroy, Pennant, the Jussieus, Lacepede, Haüy, Bergmann, Kirwan, Werner, Shaw, Smith, &c. &c.

The absorption of heat, during the conversion of ice into water, appears to have been separately observed by De Luc, Black, and Wilke, about the year 1755. On this experiment Dr. Black principally founded his doctrine of latent heat, supposed to be retained in chemical combination by the particles of fluids. Dr. Irvine and Dr. Crawford explained the circumstances somewhat differently, by the theory of a change of capacity for heat only. Bergmann, Lavoisier, Seguin, Kirwan, Laplace, and many other philosophers, have illustrated, by experiments and calculations, the various opinions which have been entertained on this subject; and few chemists, from the times of Boerhaave, Stahl, and Scheele, to those of Priestley and other later authors, have left the properties of heat wholly unnoticed. For an account of the elegant hypothesis of Aepinus respecting magnetism and electricity, founded in a great measure on the theory of Franklin, and advanced in 1759, we refer to MAGNETISM and ELECTRICITY. The electrophorus of Wilke, and the condenser of Volta, are among the earliest fruits of the cultivation of a rational system of electricity. (See ELECTROPHORUS and CONDENSER.) Mr. Cavendish's investigation of the properties of the torpedo may serve as a model of accuracy and precision in the conduct of experimental researches. (See TORPEDO.) The speculations of Boscovich respecting the fundamental properties of matter, and the general laws of the mutual action of bodies on each other, (see MATTER,) have been considered by some candid judges as deserving the highest commendation: they remain, however, says Dr. Young, almost in all cases speculations only; and some of the most intricate of them, being calculated for the explanation of some facts which have perhaps been much misunderstood, must consequently be both inaccurate and superfluous. The attention of several experienced philosophers, now living, has been devoted, with much perseverance, to the difficult subject of hygrometry: such are De Luc, Saussure, Pictet, and Dalton. For some years past, the discoveries of Galvani, Volta, and others, have commanded particular attention; for an account of which, see GALVANIC BATTERY, GALVANISM, and VOLTAISM. Count Rumford has not only contributed to the extension of physical science by his own experiments and observations relating to light and heat, and also other subjects, but by his establishment of a prize medal to be given at the interval of every three years by the Royal Society to the

author of the most valuable discovery concerning heat or light. Professor Leslie entitled himself to one of these medals by his interesting discovery of the different properties possessed by surfaces of different kinds, with regard to the emission or reception of radiant heat. Perhaps, however, says Dr. Young, none of the modern improvements in speculative science deserve a higher rank than Dr. Herschel's discovery of the separation of heat from light by refraction. M. Prévost has made some just remarks on the experiments of other philosophers respecting heat; and his own theory of radiant heat, and his original investigations on the effects of the solar heat on the earth, have tended materially to illustrate the subject of his researches. The general laws of the ascent and descent of fluids in capillary tubes, and between plates of different kinds, had been long ago established by the experiments of Hauksbee, Jurin, and Muschenbroek (see ASCENT of Fluids, and CAPILLARY Tubes): many other circumstances, depending on the same principles, had been examined by Taylor, Achard, and Guyton; and some advances towards a theory of the forms assumed by the surfaces of liquids, had been made by Clairaut, Segner, and Monge. Dr. Young, in an essay on the cohesion of fluids, read before the Royal Society in the year 1804, has reduced all effects of this nature to the joint operation of a cohesive and repulsive force, which balance each other; assuming only that the repulsion is more augmented by the approach of the particles to each other than the cohesion: and he has thus discovered a perfect correspondence between many facts, which had not been supposed to have the slightest connection with each other. About a year after the publication of this paper, M. Laplace read to the National Institute at Paris a memoir on capillary tubes, in which, as far as he has pursued the subject, he has precisely confirmed the most obvious of Dr. Young's conclusions, although his mode of calculation appears, in our author's judgment, to be by no means unexceptionable, as it does not include the consideration of the effects of repulsion.

Dr. Young, of whose history of Terrestrial Physics in the first volume of his "Course of Lectures on Natural Philosophy and the Mechanical Arts," we have availed ourselves in the compilation of this article, closes his history with the following observations. "When we reflect on the state of the sciences in general, at the beginning of the 17th century, and compare it with the progress which has been since made in all of them, we shall be convinced that the last two hundred years have done much more for the promotion of knowledge, than the two thousand that preceded them: and we shall be still more encouraged by the consideration, that perhaps the greater part of these acquisitions has been made within fifty or sixty years only. We have therefore the satisfaction of viewing the knowledge of nature not only in a state of advancement, but even advancing with increasing rapidity; and the universal diffusion of a taste for science appears to promise, that, as the number of its cultivators increases, new facts will be continually discovered, and those, which are already known, will be better understood, and more beneficially applied. The Royal Institution, with other societies of a similar nature, will have the merit of assisting in the dissemination of knowledge, and in the cultivation of a taste for its pursuit; and the advantages arising from the general introduction of philosophical studies, and from the adoption of the practical improvements depending on them, will amply repay the labours of those, who have been active in the establishment and support of associations so truly laudable."

Chronology of Physical Authors.

700 B. C.	600	500	400	300	200
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.T H A	L E S.	A N A X A G O R A S.	T H E O P H R A S T U S.		
.A N A X I M A N D E R		D E M O C R I T U S.	E P I C U R U S.		
	A N A X I M E N E S.	P L A T O.			
	P Y T H A G O R A S.	A R I S T O T L E.			
	H E R A C L I T U S				
200 B. C.	100	BIRTH OF CHRIST.	100	200	300
. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
	D I O S C O R I D E S	P L I N Y.			
300	400	500	600	700	800
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800	900	1000	1100	1200	1300
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				R. B A C O N.	
				G I O J A	
				A D S I G E R	
				D A N	
1300	1400	1500	1600	1700	1800
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T E.		G E S N E R.	R A Y.	P R I E S T L E Y	
		A L D R O V A N D U S.	W I L L U G H B Y	B E R G M A N N	
		G I L B E R T.	H O O K E	I R V I N E.	
		J. B A U H I N.	N E W T O N.	G A L V A N I	
		G O R L A E U S.	C R O U N E	R O B I S O N.	
		B A C O N.	T O U R N E F O R T	S C H E E L E.	
		C. B A U H I N.	H A L L E Y	S A U S S U R E	
		G A L I L E O.	S T A H L	L A V O I S I E R.	
		D R E B E L	B O E R H A A V E.	C R A W F O R D.	
		D E S C A R T E S.	J U R I N.		
		G E L L I B R A N D	S. G R A Y.		
		G U E R I C K E.	H A U K S B E E		
		T O R R I C E L L I	R E A U M U R.		
		P A S C A L	R I C H M A N N.		
		B O Y L E.	M U S S C H E N B R O E K		
			D U F A Y.		
			J U S S I E U.		
			N O L L E T.		
			F R A N K L I N.		
			E U L E R.		
			L I N N E.		
			B O S C O V I C H.		
			K L E I S T.		
			D A U B E N T O N.		
			D E G E E R		
			M A Y E R.		
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			B L A C K.		
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			S P A L L A N Z A N I.		

Physics may be divided, with regard to the manner in which it has been treated, and the persons by whom, into

*Physics*, Symbolical, or such as was couched in symbols: such was that of the old Egyptians, Pythagoreans, and Platonists, who delivered the properties of natural bodies under arithmetical and geometrical characters, and hieroglyphics.

*Peripatetical*, or that of the Aristotelians, who explained the nature of things by matter, form, and privation, elementary and occult qualities, sympathies, antipathies, attractions, &c. See ARISTOTELIAN and PERIPATETICS.

*Experimental*, which inquires into the reasons and natures of things from experiments, such as those in chemistry, hy-

drostatics, pneumatics, optics, &c. See EXPERIMENTAL *Philosophy*.

And finally, *mechanical*, or *corpuscular*, which explains the appearances of nature from the matter, motion, structure, and figure of bodies, and their parts: all according to the settled laws of nature and mechanics. See MECHANICAL and CORPUSCULAR *Philosophy*.

PHYSIOGNOMICS, a term used by some physicians and naturalists, for such signs as are taken from the countenance to judge of the state, disposition, &c. of the body and mind.

PHYSIOGNOMY, φυσιογνωμία, formed from φύσις, nature, and γινώσκω, I know, the art of knowing the humour,

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temperament, or disposition of a person, from observation of the lines of his face, and the characters of its members or features; or of designating the powers and dispositions of the mind by a peculiar combination of the features.

Baptista Porta and Robert Fludd, to whom we may add in later times, Gall, Camper, Lavater, and Blumenbach, are the best modern authors on physiognomy. The ancient ones are the sophists Adamantius and Aristotle: the physiognomy of which last we have translated into Latin by de Lacuna.

With respect to physiognomy, this at least may be said, that of all the fanciful arts of the ancients, disused for a considerable time, but lately revived among the moderns, there is none has so much foundation in nature as this.

There is an apparent correspondence between the face and the mind: the features and lineaments of the one are directed by the motions and affections of the other; there is even a peculiar arrangement of the members of the face, and a peculiar disposition of the countenance, corresponding to each particular affection of the mind.

In effect, the language of the face, physiognomy, as the zealous advocates of this art pretend, is as copious, nay, perhaps, as distinct and intelligible, as that of the tongue, speech. In other words, it is plain to the most inattentive observer, that each individual of the human race possesses a set of distinctive marks in the form of the head, and the outlines of the countenance: in proof of which we refer to the articles CRANIOLOGY, CRANIUM, and MAN. It is also well known and universally allowed, that these marks insensibly lead us to form conclusions as to the nature and inclinations of persons at the first sight, or on the slightest acquaintance with them; which notions are sometimes just, but often erroneous.

The foundation of physiognomy, as some have stated it, is this: the different objects that present themselves to the senses, nay, the different ideas that arise in the mind, do each make some impression on the spirits; and each an impression correspondent or adequate to its cause: therefore each makes a different impression.

If it be asked, how such an impression should be effected, it is easy to answer, that it follows from the economy of the Creator, who has fixed such a relation between the several parts of the creation, to the end that we may be apprized of the approach or recess of things useful or hurtful to us.

The animal spirits, say the Cartesians, moved in the organ by an object, continue their motion to the brain: whence that motion is propagated to this or that particular part of the body, as is most suitable to the design of nature; having first made a proper alteration in the face, by means of its nerves, especially the pathetici, and oculorum motorii.

The face, here, does the office of a dial-plate; and the wheels and springs, withinside the machine, actuating its muscles, shew what is next to be expected from the striking part.

Now if, by repeated acts, or the frequent entertaining of a favourite passion, or vice, which natural temperament was hurried, or custom dragged one to, the face is often put in that posture which attends such acts; the animal spirits will make such patent passages through the nerves (in which the essence of an habit consists), that the face is sometimes unalterably set in that posture (as the Indian religious are by a long continued sitting in strange postures in their pagods); or, at least, it falls, insensibly and mechanically, into that posture, unless some present object distort it therefrom, or some dissimulation hide it; and this reasoning, it has been said, is confirmed by observation; which, y being a little

more accurate and minute, would serve to distinguish not only habits and tempers, but even professions. After all, this is a kind of science which must be very precarious and delusive. (See LAVATER.) It should therefore be exercised with great judgment and discretion; otherwise we may deduce from it conclusions that are equally unfounded and injurious. To the observations on the theory of this science already introduced under the articles to which we have above referred, we shall here subjoin an account of the system of Lavater, which not long ago excited the public curiosity, though it is now almost forgotten.

Lavater asserts, that "each creature is indispensable in the vast compass of creation; but each individual," he adds, "is not alike informed of the truth of this fact, as man only is conscious that his own place cannot be supplied by another." The idea thus conceived, he thinks one of the best consequences of physiognomy, and he exults, that the most deformed and wicked persons are still superior to the most perfect and beautiful animal, because they always have it in their power to amend, and in some degree to restore themselves to the place assigned them in creation; and however their features may be distorted by the indulgence of their passions, still the image of the Creator remains, from which sin only is to be expelled, to render the likeness nearer perfection. In pointing out the distinguishing traits that discriminate the natives of different regions, Lavater observes, that the placing of several persons together, selected from nations remotely situated from each other, gives at one glance their surprising varieties of visage; and yet he acknowledges that to point out those variations is a task of considerable difficulty, and his assertion, that this may be done with more facility from an individual than the mass of population, seems extremely probable. The French, he thinks, do not possess equally commanding traits with the English, nor are they so minute as those of the Germans, and it is to the peculiarities of their teeth, and manner of laughing, that he attributed his power of deciding on their origin. The Italians he appropriated by the form of their noses, their diminutive eyes, and projecting chins. The eye-brows and foreheads are the criterion by which to judge of the natives of England. The Dutch possess a particular rotundity of the head, and have weak, thin hair: the Germans, numerous angles and wrinkles about the eyes and in the cheeks; and the Russians are remarkable for black and light coloured hair, and flat noses.

It must be extremely grateful to the natives of England to reflect, that Lavater considers them, in the aggregate, the most favoured upon the earth with respect to personal beauty; he says, they have the shortest and best arched foreheads, and that only upwards, and towards the eye-brows, sometimes gradually declining, and in other cases are rectilinear, with full, medullary noses, frequently round, but very seldom pointed, and lips equally large, well defined, curved, and beautiful, with the addition of full round chins. Still greater perfections are attributed to the eyes of Englishmen, which are said to possess the expression of manly steadiness, generosity, liberality, and frankness, to which the eye-brows greatly contribute. With complexions infinitely fairer than those of the Germans, they have the advantage of escaping the numerous wrinkles found in the faces of the latter, and their general *contour* is noble and commanding.

Judging from the ladies he had seen of our country, and from numerous portraits of others, Lavater was led to say, they appeared to him wholly composed of nerve and marrow, tall and slender in their forms, gentle, and as distant from coarseness and harshness as earth from heaven. His own countrymen he found to have many characteristic

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varieties: those of Zurich are generally meagre, and of the middle size, and either corpulent or very thin.

To pursue this subject something further, it will be found, that the people of Lapland, and parts of Tartary, are of very diminutive stature, and of extremely savage countenances, formed by flat faces, broad noses, high cheek-bones, large mouths, thick lips, peaked chins, and their eyes are of a yellow brown, almost black, with the lids retiring towards the temples; nor are the females of this disagreeable race more favoured by nature; and each sex is distinguished by the grossest manners, and minds stupid beyond credibility; but of all the varieties of the human species, the inhabitants of the coast of New Holland seem the most debased and miserable; those are tall and slender, and to add to the deformity of thick lips, large noses, and wide mouths, they are taught from their infancy to keep their eyes nearly closed, to avoid the insects which swarm around them.

Turning to the more favourable side of this picture of national physiognomy, we shall find the people of Cachemire, the Georgians, the Circassians, and Mingrelians, erect, noble, and formed for admiration, particularly the females, whose charms of face and person are proverbial.

There are too many local and physical causes for this difference in the external appearance of the inhabitants of the different parts of the world, for enumeration and explanation in so confined a space as that to which we are limited. Professor Kant, of Konigsberg, in an essay on this subject, divides the human race into four principal classes, into which the intermediate gradations may readily be resolved: those are the Whites, the Negroes, the Huns, (Monguls or Calmucs,) and the Hindoos, or people of Hindoostan. Circumstances purely external may be the accidental, but cannot be the original causes of what is assimilated or inherited: as well could chance produce a body completely organized. "Man," says the professor, "was undoubtedly intended to be the inhabitant of all climates and all soils. Hence the seeds of many internal propensities must be latent in him, which shall remain inactive, or be put in motion according to his situation on the earth: so that in progressive generation, he shall appear as if born for that particular soil in which he seems planted."

In the opinion of this gentleman, the air and the sun are the two causes which most powerfully influence the operations of propagation, and give a lasting development of germ and propensities, or in other words, the above powers may be the origin of a new race.

Food may produce some slight variations; these, however, must soon disappear after emigration, and it is evident, that whatever affects the propagating powers, does not act upon the support of life; but upon the original principle, the very source of animal conformation and motion. It has been observed, that man degenerates in stature and faculties the nearer he is situated to the frigid zone: this seems a necessary consequence of that situation, for this obvious reason; were men of the common stature in those regions of extreme cold, the impelling power of the heart must be increased, to force the blood through the extremities, which would otherwise chill, and become totally useless; but as the Creator did not think it useful to adopt this mode of preserving the limbs, they have been shortened, for the purpose of confining the circulating fluid to the trunk, where the natural heat accumulating, the whole body has a greater proportion of that comfortable sensation than strangers feel when visiting those northern countries.

The propensity to flatness, observable in the prominent parts of the countenance of the persons under consideration, exposed to the effects of cold, is accounted for by that very

circumstance; and it appears probable, that their high cheek-bones, and small, imperfect eyes are so contrived, to preserve the latter from the piercing effects of the wind, and the offensive brilliancy of the almost eternal snows. The abbé Winkelman attributes the enormous and disgusting lips of the Negroes to the heat of the climate they inhabit; others account for the blackness of their skin by supposing "the surplus of the ferruginous, or iron particles, which have lately been discovered to exist in the blood of man, and which, by the evaporation of the phosphoric acidities, of which all Negroes smell so strong, being cast upon the retiform membrane, occasions the blackness which appears through the cuticle, and this strong retention of the ferruginous particles seems to be necessary, in order to prevent the general relaxation of the parts."

In pointing out the distinguishing traits that discriminate the natives of different regions, Lavater observes, that a person deeply enamoured of another, and thinking intensely on the form and position of their features, might assume a resemblance of the admired object, though miles of space intervened between them; and pursuing his mental dream, he adds, that it is equally probable an individual meditating revenge in secret, may compose his countenance into a likeness of him who was to be its victim. The incorrectness of the latter fancy may be exposed by merely observing that the person under the influence of the passion of revenge, must bear in his countenance the lines expressive of that restless affection; now as the object intended to be injured is unconscious of the secret machinations against him, he may at the instant be engaged in some benevolent pursuit, or may feel some internal joy which moulds his features into an expression directly opposite to that of his adversary, who may have generally seen him thus; for revenge is often aimed by the wicked at the best of men: consequently, the countenance of a fiend grinning with malice cannot at the same time beam with a complacency arising from a set of features entirely unruffled.

Before we enter upon a description of the marks which, according to Lavater, point out the character of the possessor, it may be proper to give one or two instances of the fallacy, and of the truth, of the conclusions drawn from them, in order that our readers may form their own conclusions, as to the folly or propriety of entertaining a propensity to form a judgment of mankind from the shapes of their noses, eyes, foreheads, and chins.

M. Sturtz declared to Lavater, that he "once happened to see a criminal condemned to the wheel, who, with fanatic wickedness, had murdered his benefactor, and who yet had the benevolent and open countenance of an angel of Guido. It is not impossible, adds this gentleman, to discover the head of a Regulus among guilty criminals, or of a vestal in the house of correction." Lavater admits this assertion in its fullest extent, but his reasoning to reconcile it to his system is by no means conclusive.

When we hear of any atrocious act, the natural abhorrence of vice and cruelty implanted in us, leads the imagination to form a portrait of the perpetrator, suited to the deformity of the mind capable of committing it; without reflecting, that had such an index existed in the countenance of the abhorred object, it is most probable, his murderous and horrible exterior would have placed mankind so far on their guard as to detect his intentions. Upon viewing the culprit, we are perhaps surpris'd to find that there is nothing particularly indicative of cruelty in the outlines of his face, and we indolently endeavour to force each into the immediate form of our preconceived portrait; this occasions us to read lurking villainy in his eyes, and converts the wrinkles

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kles of disease, or approaching age, into the frown of a *dæmon*; and we depart exclaiming against the striking contour of the miserable wretch, when, perhaps, many of our friends, and even relatives, would suffer by a comparison, and yet had led uniformly innocent lives. On the other hand it must be admitted, that vice generally stamps her votaries with marks, which may be known at a glance, but this admission applies only to the confirmed enemies of virtue, those whose habits of living are so uniformly vicious, that very little propriety occurs in their conduct.

The following anecdote, related by Lavater, may serve as a partial illustration of the assertion, that the features are affected by the turn of the mind, or, perhaps, more correctly speaking, the muscles of the face. An innocent, amiable, and virtuous young lady, of high birth, who had been educated in the retirement of the country, happened one evening to pass a mirror, immediately after having attended evening prayers, and with a candle in her hand was depositing a bible on a table, when she observed her image reflected in the glass: affected with a sense of humility, and of extreme modesty, she averted her eyes and retired. A succeeding winter was passed in the amusements and dissipation of a city, where this lady had the misfortune to forget all her previously devout pursuits: but returning to the country, she once more passed the glass and the bible, and saw her features reflected, now deprived of those fascinating graces which belong alone to the serene and happy state of mind she had lost. Alarmed at the change, she fled from the spot, and retiring to a sofa, ejaculated sentences of penitence, and formed resolutions of future amendment.

Lavater begins his remarks on the human face with the forehead. According to this observer, the general form, proportion, the arch obliquity, and position of the skull of the forehead, denote the degree of thought, the sensibility, the mental vigour, and the propensities of man; and at the same time the skin of this part of the head explains, by its hue, tension, or wrinkles, the state of the mind at the moment of observation, and the passions which influence it, the bones affording the internal quantity, and the covering the application of power: however the latter may be affected, it is well known that the bones must remain unaltered, and yet they regulate the wrinkles by their variation of component form. Wrinkles are produced by a certain degree of flatness; others arise from arching, and these considered separately will give the form of the arch, and *vice versa*. Some foreheads are furnished with wrinkles that are confined to horizontal, perpendicular, curved, and others confused and mixed lines; those least perplexed when in action are usually observed in foreheads without angles.

Lavater appears to have been the first who attended to the peculiar turns of the position and outline of the forehead, which he considered the most important part presented for the study of the physiognomist. This he divides into three classes, and those he termed the perpendicular, the projecting, and the retreating, each possessing a number of variations; the principal, however, are rectilinear, "half round, half rectilinear, flowing into each other; half round, half rectilinear, interrupted; curve-lined, simple; the curve lined double and triple."

A long forehead denotes much capacity of comprehension, and less activity; a compressed, short, and firm forehead, more compression, stability, and little volatility; severity and pertinacity belong to the rectilinear; and the more curved than angular portends flexibility and tenderness of character; deficiency of understanding is discoverable in those whose foreheads are perpendicular from the hair to the eye-brows; but the perfectly perpendicular, gently arched

at the top, signifies that the possessor thinks coolly and profoundly. The projecting forehead indicates stupidity and mental weakness; the retreating, exactly the reverse; the circular, and prominent above, with straight lines below, and nearly perpendicular, shews sensibility, ardour, and good understanding; the rectilinear oblique forehead has the same properties; arched foreheads are considered as feminine; an union of curved and straight lines, happily disposed, with a similar position of the forehead, gives the character of consummate wisdom. "Right lines, considered as such, and curves, considered as such, are relaxed, as power and weakness, obstinacy and flexibility, understanding and sensation." When the bones surrounding the eye project, and are sharp, the person thus formed possesses a powerful stimulus to exercise a strong mental energy, which is productive of excellent and well digested plans, and yet this doth not seem a peculiar mark of wisdom, as many wise men have been known without it: those thus circumstanced have more firmness, when the forehead rests perpendicularly upon horizontal eye-brows, and is considerably rounded towards the temples. Perpendicular foreheads, which, however, project so as not to rest on the nose, and which are short, small, shine, and are full of wrinkles, give undoubted indications of a weakness of the thinking faculties; perseverance and oppressive violent activity, united with vigour and harshness, belong to the forehead composed of various confused protuberances; and on the other hand, when the profile of this part of the head affords two well proportioned arches, the lowest projecting, it is a certain sign of a good temperament and a sound understanding. All great and excellent men have been found to have their eye-bones firmly arched, and well defined; and circumspection, followed by stability, attends square foreheads, with spacious temples, and eye-bones of the above description; when perpendicular natural wrinkles appear, they express power of mind and application; but horizontal, interrupted in the middle, or broken at the extremities, betray, in general, negligence, if not want of ability.

Deep indenting in the bones of the forehead situated between the eye-brows, and extending in a perpendicular direction, mark the happy few who possess generous and noble minds, connected with excellence of understanding; besides, a blue *vena frontalis*, in the form of a Y, situated in an arched smooth forehead, is an indication of similar advantages. Lavater having given the above hints, describes the following characteristics, which he asserts, give "the indubitable signs of an excellent, a perfectly beautiful and significant, intelligent, and noble forehead." Such must be one-third of the face in length, or that of the nose, and from the nose to the chin; the upper part must be oval, in the manner of the great men of England, or nearly square; the skin must be smooth, and wrinkled only when the mind is roused to just indignation, or deeply immersed in thought, and during the paroxysm of pain; the upper part must recede, and the lower project; the eye-bones must be horizontal, and present a perfect curve upon being observed from above; an intersecting cavity should divide the forehead into four distinct parts, but with that slight effect as to be only visible with a clear descending light; and all the outlines should be composed of such, that if the section of one-third only is observed, it would be difficult to decide whether they were circular or straight; to conclude this portrait of a transcendent forehead, the skin must be more transparent, and of a finer tint than the remainder of the face. Should an infant, a relative, or a friend, who possesses a forehead resembling the above description, seriously err, the good enthusiast intreats, that the corrector may not despair of success,

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cells, as in all human probability the latent seeds of virtue may be roused into growth by perseverance, and finally produce the desired fruit.

The eyes of mankind are composed of various shades of colour, the most common of which are grey mixed with white, grey tinged with blue, and shades of green, orange, and yellow. According to Buffon, the orange and blue are most predominant, and those colours often meet in the same eye; those generally supposed to be black are not really so, and may be found, on attentive examination, and with a proper disposition of the light, to consist of yellow, a deep orange, or brown, which being violently opposed to the clear white of the ball, assumes a darkness mistaken for black. The same naturalist observes, that shades of yellow, orange, blue and grey, are visible in the same eye; and when blue, even of the lightest tint, appears, it is invariably the predominant colour, and may be found in rays dispersed throughout the iris: the orange is differently disposed, at a trifling distance from the pupil, is in flakes, and round; but the blue so far overpowers it, that the eye assumes the appearance of being wholly of that colour. The fire and vivacity emitted by the eye cannot be so powerful in those of the lighter tints; it is therefore in the dark ones alone that we look for the emotions of the soul; quiet and mildness, and a certain degree of archness, are the characteristics of the blue. Some eyes are remarkable for the absence of colour; the iris is faintly shaded with blue or grey, and the tints of orange are so light, that they are hardly observable: in eyes thus constituted, the black of the pupil appears too conspicuous, and it may be said, that portion is alone visible at a little distance, which circumstance gives the person a ghastly and spiritless appearance.

There are eyes whose iris may be said to be almost green; but these are very uncommon. It would require the pen of an inspired writer to describe the astonishing variety of expression of which the eyes are capable: being situated near the supposed seat of the soul, every sensation of that invisible spirit appears to rush in full vigour from those intelligent organs: all the passions may be seen in them; we shrink from their indications of anger, we find pleasure with all her train of joys dancing in them, we feel their force in love, and melt into tears upon observing them suffused with the moisture of grief; in short, their language is far more powerful than that of the tongue. The transitions are so rapid in the expression of the eyes, that it requires very close and attentive examination to catch and describe the emotions of the mind visible in them; admitting this fact, it will appear that the physiognomist is liable to numerous and egregious errors in drawing his conclusion of propensities from them. Paracelsus, a man of strong genius, and, like Lavater, misguided in many instances by enthusiasm, and a kind of superstition allied to the study of this art or science, pronounced that those eyes generally termed black frequently denoted health, firmness, courage, and honour; but the grey, deceit and instability. Thus far probability at least accompanies his remarks. It is, however, impossible to subscribe to his assertion, that short-sighted persons are deceitful and crafty, or that those who squint have similar propensities to evil, as it is evident both the peculiarities alluded to are the consequences of injury, and are never found in people whose organs of vision are perfect: indeed many instances might be cited of the actual and known cause of squinting and near sight, which frequently occur in adults from extreme anxiety and disease.

Small eyes situated deep in the sockets are said, by Paracelsus, to indicate active wickedness, with a mind calculated

to oppose with vigour, and suffer with perseverance; and their opposites, or very large prominent eyes, he conceived, explained the avaricious, covetous, propensities of their possessor; those in constant motion denote fear and care; winking is the mark of foresight, of an amorous disposition, and quickness in projecting; and the eye fearful of looking directly forward, decides upon innate modesty.

Lavater thought blue eyes, in general, signified effeminacy and weakness, and yet he acknowledged that many eminent men have had blue eyes; still he was convinced that strength and manhood more particularly belong to the brown: in opposition to this opinion, the Chinese, who are known to be an imbecile people, rarely have blue eyes; these contradictions, it must be confessed, weaken the reliance we are inclined to place on appearances during the quiescent state of the eyes, and the indications of their colour. Men intemperate in anger, and easily irritated, may be found with eyes of all the usual colours; when they incline to green, ardour, spirit, and courage, are constant attendants. People of a phlegmatic habit, but who may be roused to activity, have clear blue eyes, which never belong to those inclined to melancholy, and they rarely belong to the choleric. Benevolence, tenderness, timidity, and weakness, are exhibited by the perfectly semi-circular arch formed by the under part of the upper eye-lid; persons of acute and solid understandings have a generous open eye, composing a long and acute angle with the nose; and when the eye-lid forms a horizontal line over the pupil, it is a strong indication that he who possesses it is subtle, able, and penetrating. Widely opening lids, shewing the white of the ball under the other colours, may be observed in the phlegmatic and timid, as well as in the courageous and rash; but upon comparing these marks in the different characters just mentioned, a very perceptible difference is discovered in the characteristics of the eyes; the latter are less oblique, better shaped, and more firm.

The eye-brows are essential in the expression of the eyes; in anger they are brought down and contracted; in all pleasant sensations, and in astonishment, they assume a fine arch; in youth they are naturally and regularly arched; the horizontal and rectilinear eye-brows belong to the masculine bias of the soul; and the above designations combined shew strength of understanding, united with feminine kindness; those that are deranged in their appearance, and the hairs growing in various directions, demonstrate a wild and perplexed state of mind; but if the hair is fine and soft, they signify gentle ardour. The compressed firm eye-brow, formed of parallel hairs, is a certain proof of profound wisdom, true perception, and a manly, firm habit of thought. There are eye-brows which meet across the nose; this circumstance gives the person an air of ferocious gloom, which is admired by the Arabs, but the ancients, versed in physiognomy, conceived such to be the characteristic of cunning; Lavater, on the contrary, observes, that he had discovered them on the most worthy and open countenances, admitting at the same time that they may denote a heart ill at ease. Those who think profoundly, and those equally prudent and firm in their conduct, never have high and weak eye-brows, in some measure equally dividing the forehead; they rather betray debility and apathy, and though men of an opposite character may be found with them, they invariably signify a diminution of the powers of the mind. Thick angular eye-brows, interrupted in their lengths, signify spirit and activity; and when they approach the eyes closely, the more firm, vigorous, and decided, is the character; the reverse shews a volatile and less enterprising disposition; when the extremes are remote from each other, the sensations of the possessor

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are sudden and violent. White eye-brows are demonstrative of weakness, in the same degree that the dark brown are of firmness.

The good Lavater considered the nose as the abutment, or buttress, of the forehead, the seat of the brain, without which the whole face would present a miserable appearance; indeed an ugly or disagreeable set of features is never accompanied by a handsome nose: but there are thousands of fine and expressive eyes where a perfectly formed nose is wanting: he describes this portion of the face as requiring the following peculiarities: "Its length should equal the length of the forehead; at the top should be a gentle indenting; viewed in front, the back should be broad, and nearly parallel, yet above the centre something broader; the bottom, or end of the nose, must be neither hard nor fleshy, and its under outline must be remarkably definite, well delineated, neither pointed nor very broad; the sides, seen in front, must be well defined, and the descending nostrils gently shortened; viewed in profile, the bottom of the nose should not have more than one-third of its length; the nostrils above must be pointed below, round, and have in general a gentle curve, and be divided into equal parts by the profile of the upper lip; the side, or arch of the nose, must be a kind of oval; above, it must close well with the arch of the eye-bone, and near the eye must be at least half an inch in breadth. Such a nose is of more worth than a kingdom." Numbers of great and excellent men have flourished in all ages of the world, whose noses would suffer essentially by a comparison with Lavater's description of a nose, more valuable to the possessor than extensive empire: indeed, he is compelled to acknowledge this indisputable fact, and observes that he has seen persons endowed with purity of mind, noble in their conceptions, and capable of exertion, whose noses were small, and the arches of their profiles inverted; and yet true to his first principles, he discovered, or imagined he discovered, their worth to consist chiefly in the elegant effusions of their imaginations, their learning, or fortitude in suffering, and this is accompanied with a proviso that the remainder of their form must be correctly organized.

Noses arched near the forehead belong to those who possess the energy to command, are capable of ruling, acting, overcoming, and destroying; others, recilinear, are the medium between the extremes above noticed, and are appropriated by nature to persons who act and suffer with equal power and patience. Socrates, Lairelle, and Boerhaave, were great men, and had ill-shaped noses, and were distinguished for meekness and gentleness. Were it possible to attribute a general prevalence of disposition to a general form of the nose, individuals of every nation would be found to resemble the Tartars, who have flat indented noses, the Negroes who have broad, and the Jews who have high arched noses, in their propensities, and it must follow that whatever qualities the physiognomist may apply to those individuals, must also belong to the whole people whose noses bear a resemblance to them; were this particular accurately examined into, it would tend, in a great measure, to confirm the correctness or incorrectness of the science, as it has hitherto been practised.

The admirers of this study attribute great powers to the mouth, in expressing the emotions of the mind; and Lavater expatiates on it with enthusiastic fervour indeed: "Whoever," he exclaims, "internally feels the worth of this member, so different from every other member, so inseparable, so not to be defined, so simple, yet so various; whoever, I say, knows and feels this worth, will speak and act with divine wisdom." He then proceeds to call it "the chief seat

of wisdom and folly, power and debility, virtue and vice, beauty and deformity, of the human mind; the seat of all love, all hatred, all sincerity, all falsehood, all humility, all pride, all dissimulation, and all truth." Granting the benevolent pastor full assent to these observations on the mouth, it becomes the indispensable duty of all men to notice the physiognomy, or indications of that organ; in making those observations, it will be necessary to examine the lips separately, and to ascertain when they are closed, during the moments of perfect tranquillity, whether that operation is performed without a forcible exertion of the muscles, particularly the middle of the upper and under lips, the bottom of the middle line at each end; and finally, the extending of the middle line on both sides.

The character of the man is proclaimed in the lips, the more firm the latter the more fixed the former; the weak and irresolute man has weak lips, with rapidity in their motion. The vicious, cringing, mean, and bad countenance is never formed with lips well defined, large, and justly proportioned to the other parts of the face, and the line of which is equally serpentine on each side; such, though they may denote a tendency to sensuality, belong exclusively to a character deserving of admiration in most relations of life.

A mouth, the lips of which are so thin as to present, at first view, little more than a line, is said to indicate apathy and quiet, but industrious when roused. When this description of mouth is raised at the extremities, vanity or vain pretensions, affectation, and probably deliberate malice, distinguish those so formed. The opposite of this kind of lips, swelled into considerable size, is a mark of indolence and sensuality. The "cut through, sharp drawn lip," as Lavater terms some, has to contend with avarice and anxiety. Lips closed accurately, without exertion, and handsome in their outline, belong to the exercise of discretion and firmness. Lips with the latter advantage, and the upper projecting, is generally appropriated to the virtuous and benevolent, though there are, without doubt, numberless persons of excellent character whose under lips project, but in Lavater's opinion, the last peculiarity implies a well-meaning man, whose goodness consists rather of cold fidelity than ardent friendship. The under lip, hollowed in the middle, denotes a fanciful character. Let the moment be remarked, when the conceit of the jocular man descends to the lip, and it will be seen to be a little hollow in the middle.

The mouth remaining naturally closed, invariably signifies fortitude and courage. When the latter quality is in operation, the mouth closes insensibly; the naturally open mouth makes a disposition to complain; the closed, on the contrary, designates endurance. "Though physiognomists," adds Lavater, "have as yet but little noticed, yet much might be said concerning the lips improper, or the fleshy covering of the upper teeth, on which anatomists have not, to my knowledge, yet bestowed any name, and which may be called the curtain, or pallium, extending from the beginning of the nose to the red upper lip proper. If the upper lip improper be long, the proper is always short; if it be short and hollow, the proper will be large and curved:—another certain demonstration of the conformity of the human countenance. Hollow upper lips are much less common than flat and perpendicular; the character they denote is equally uncommon."

The ancients who studied the physiognomy of man, supposed that diminutive short teeth betrayed the weakness of those who possessed them; more modern observers contradict this supposition, and declare that men of uncommon strength have such, but they are rarely of that pure white so necessary

to preserve the general beauty of the countenance. Teeth of unusual length, and narrow, are signs of weakness and cowardice; those justly proportioned to each other, white and transparent, which appear immediately upon opening of the mouth, though not projecting, and entirely exposed to view, from the insertion in the gums to the opposite extremities, are seldom to be met with in the jaws of persons who possess unamiable propensities; when teeth of a different description are discovered belonging to amiable and worthy characters, enquiry will generally satisfy the physiognomist that his conclusions on this head were just, and that the blackness and derangement were occasioned by disease.

In one way the observer and admirer of this art cannot possibly be mistaken, for he that neglects his teeth, suffering them to decay through contempt of public opinion and indolence, may be safely pronounced an unhappy character, with many evil propensities.

The chin alone remains to be noticed in this slight survey of the human face, as connected with the internal operations of the soul or mind. The projecting chin is said to mark something decided, and the receding the reverse; and it has been asserted that the presence or absence of strength is frequently demonstrated by the form of this part of the countenance; it has also been remarked, that sudden indentings in the midst of the chin are peculiar to men of excellent cool understandings, unless attended by marks of a contrary tendency. When the chin is pointed, those so formed are supposed to be penetrating and cunning, though it seems there are people with pointed chins who are different at least in the latter particular; and here again the chin offers a certain criterion for the physiognomist, who may securely pronounce a large fat double chin an appendage of gluttony. "Flatness of chin speaks the cold and dry; smallness, fear; and roundness, with a dimple, benevolence."

"No one," says Lavater, "whose person is not well formed can become a good physiognomist. Those painters were the best whose persons were the handsomest. Rubens, Vandyke, and Raphael, possessing three gradations of beauty, possessed three gradations of the genius of painting. The physiognomists of the greatest symmetry are the best. As the most virtuous can best determine on virtue, so can the most handsome countenances on the goodness, beauty, and noble traits of the human countenance, and consequently on its defects and ignoble properties. The scarcity of human beauty is the reason why physiognomy is so much desired, and finds so many opponents. No person, therefore, ought to enter the fanciful of physiognomy, who has a debased mind, an ill-formed forehead, a blinking eye, or a distorted mouth. "The light of the body is the eye; if, therefore, thine eye be single, thy whole body shall be full of light! but if thine eye be evil, thy whole body shall be full of darkness: if therefore the light that is in thee be darkness, how great is that darkness?"

**PHYSIOLOGI**, in *Botany*, those authors whose writings tend to set that study in its clearest light, by explicating and enumerating the various dispositions of the male and female parts in the flowers of plants.

**PHYSIOLOGY**, *Φυσιολογια*, formed of *φύσις*, nature, and *λογία*, discourse, or reason, the doctrine of nature, or natural bodies; called also *physics*, and *natural philosophy*.

**PHYSIOLOGY** properly denotes only an internal reasoning, or discoursing, which stops or terminates in the speculation, or abstract contemplation of its object, viz. natural appearances, their causes, &c. and does not direct or prescribe rules for the making of natural things, *e. gr.* stones, plants, &c.

In which view, chemistry does not properly belong to physiology, but is a kind of counter part thereto, as in many cases, imitating nature, rather than considering and explaining her.

**PHYSIOLOGY**, according to its etymological import, signifies a discourse on nature; but it is now usually employed, in a more limited sense, to denote the science which treats of the powers that actuate the component parts of living animal bodies, and of the functions which those bodies execute. It presupposes therefore a knowledge of the structure of the body, which is the object of anatomy; the latter is conversant with the dead, the former with the living body; the one may be called the science of organization, the other the science of life.

The principal source of our physiological knowledge of the human body, is an observation of its actions in all the various states comprehended under the general terms of health and disease. The results of the latter are very instructive: comparison of the phenomena during life with the state of parts after death, shews us the uses of many organs, which cannot be submitted to direct observation in the living state. But the information derived, even from the most attentive survey of the living human being in health and disease, is still very imperfect: it leaves many interesting subjects entirely unexplained: the viscera are all so hidden by their situation, that we can hardly have the testimony of our senses for any of their functions in man. The physiologist supplies this deficiency by experiments on living animals, in whom he exposes the various internal organs, and observes the consequences of circumstances altered and combined at his pleasure. It is not our business to consider here, whether this use of sentient beings is morally justifiable; or whether it may be advantageous to the individual or society, to stifle that internal voice which remonstrates most loudly in every mind not accustomed to acts of cruelty, against the infliction of pain on beings who seem to feel it as acutely as ourselves: we have only to observe that these proceedings, however afflicting to the humane, are full of physiological instruction. A comparison of the structure and functions of animals in all classes of the animal kingdom, is another most important source of physiological knowledge. The aid of chemistry is indispensable to the physiologist in the subjects of respiration, perspiration, and the secretions; indeed in unfolding the structure of the body in general.

We must refer the reader to various articles of this Cyclopædia, for an account of the physiology of man. Under **LIFE** and **FIBRE** he will find general views of the structure and actions of the body; and under **FUNCTION**, a classification of the functions. The physiology of the thoracic organs will be found under **HEART**, **CIRCULATION**, **LUNGS**, and **RESPIRATION**; of the lymphatic system, under **ABSORBENTS** and **ABSORPTION**; of the blood-vessels, under **HEART** and **ARTERY**; of the brain, nerves, and muscles, under **BRAIN**, **NERVOUS System**, and **MUSCLE**; of the mechanical preparation of the food, and its descent into the stomach, under **DEGLUTITION**; of the changes wrought on it in the alimentary canal, under **DIGESTION**. Further remarks on subjects connected with this will be found under **LIVER**, **SPLEEN**, **PANCREAS**, **STOMACH**, and **INTESTINES**. The physiology of the urinary apparatus is considered under **KIDNEY**. The functions of the organs of sense are explained under **INTEGUMENTS**, **EYE**, **EAR**, **NOSE**, and **TONGUE**; and those of the generative organs, under **GENERATION** and **EMBRYO**. Various physiological points are considered under **GLAND**, **LARYNX**, **MEMBRANE**, and **DEATH**; also under the article **MAN**. We may also refer

to BONE, CARTILAGE, CELLULAR *Substance*, CRANIUM, and other anatomical articles.

The *Institutiones Physiologicae* of Blumenbach is the best compendium of this science: it is executed with brevity and great neatness, and is remarkable for the small quantity of objectionable matter it contains. Its well selected references will lead the student to the best sources of more detailed information. The *First Lines* of Haller, and the *Elements of Physiology* of Richerand, are inferior to the above-mentioned classical production of Blumenbach. The *Elementa Physiologiae* of Haller is a most accurate and useful repository of all the facts and opinions relating to physiological science up to the period of its publication, and supercedes the necessity of all works previous to that date. The works of John Hunter and of Bichat (his *Anatomic Generale*, and *Recherches sur la Vie et la Mort*), the *System of Physiology* of Dumas, the *Leçons d'Anatomic comparée* of Cuvier, and the *Manual* of the same science of Blumenbach, with various detached papers in the collections of learned societies in this and foreign countries, are the best sources of information subsequent to the work of Haller. More particular references will be found in the different articles.

PHYSKIUM, in *Botany*, φυσικόν, a little bladder, is a genus of Loureiro's, found in the waters of Cochinchina, which by his characters and description appears to be very near the *Valisneria oëandra*, Roxb. *Coromand.* v. 2. 34. t. 165, and probably may be the very same plant.

PHYSOCELE, from φυσα, flatus, and κλη, a tumour, in *Surgery*, a swelling occasioned by air. See EMPHYSEMA.

PHYSOMETRA, in *Medicine*, from φυσω, to inflate, and μτρα, the womb, a tympany of the womb, occasioned by air distending that organ. This is, at all events, a very rare disease, and the accounts given of it by the older authors have probably originated in mistake. Air, however, appears to be occasionally generated in the internal cavities of the living body, as Mr. John Hunter suggested, by a sort of secretion from the blood-vessels. Sauvages mentions two varieties of the disease. *Nofol. Method.* Clafs x. Gen. 14.

PHYSOSPERMUM, in *Botany*, from φυσω, to inflate, and σπερμα, seed, a genus so named by Cusson, who removed it from LIGUSTICUM, (see that article,) principally on account of the double skin of the seed, the outer coat being separated by a small cavity from the inner. The plant, on which this supposed genus depends, is no other than the so much talked of, and long so little known, *L. cornubiense* of Linnæus and *Fl. Brit.* the *L. alterum*, Lob.  *Ic.* 786; see *Juss. Gen.* 222.

PHYSSOPHORA, in *Natural History*, a genus of the class and order Vermes Mollusca. The generic character is this; body gelatinous, pendent from an aerial vesicle, with gelatinous sessile members at the sides, and numerous tentacula beneath. There are three species. They are all nearly allied to the Medusæ, and might perhaps without much impropriety be removed to that genus.

Species.

HYDROSTATICA. Oval; with numerous, lateral, three-lobed vesicles, open outwardly; middle intestine and four larger tentacula red. It inhabits the Mediterranean; is about half an inch long, compressed, and always swims with the tip of the vesicle above the water.

ROSACEA. Orbicular, and imbricate with oblong, horizontal, foliaceous membranes affixed to the vesicle. It is found in the Mediterranean. The body is hyaline, an inch

in diameter, and resembles a full blown flower bending downwards. The vesicle is obtuse, ovate, reddish, and covered with flat, obtuse, foliaceous membranes, curved and thickly laid.

FILIFORMIS. Lateral members oblong, filiform, and pendent. This is found in the Mediterranean. The body is very tender, not thicker than a thread, and a span long, hyaline, with an obtuse ovate head, about the size of a grain of rice.

PHYSTA, in *Ichthyology*, a name given by Gesner, and some others, to the fish called by the Greeks, and many of the later authors, *ballerus* and *balerus*. Artedi denies its right to any generic name, reducing it to the genus of the cyprini, to which it evidently belongs, and distinguishing it from the others of that numerous genus by the specific name of the very broad and thin cyprinus, with forty rays in the pinna ani. See CYPRINUS.

PHYSTE, in the *Writings of the Ancient Physicians*, a word used to express a mass of meal macerated in a close vessel with wine, but not left to ferment.

PHYTALIA, a word used by the ancients in two very different senses; with some expressing the latter part of the winter season, and with others a place where vines are planted, whether in standard vineyards or otherwise.

PHYTEUMA, in *Botany*, a name adopted from Dioscorides, whose φύτευμα, whatever it may have been, appears to have received that appellation from φύσις, to sow or plant. Some have supposed an allusion to the reputed qualities of the herb as a philter, which Dioscorides and Pliny mention. We can trace no reason for the Linnæan application of the name, except perhaps in the fissures or perforations of the fruit of our *Phyteuma*, to which the Greek description seems to allude. *Linn. Gen.* 89. *Schreb.* 118. *Willd. Sp. Pl.* v. 1. 919. *Mart. Mill. Dict.* v. 3. *Ait. Hort. Kew.* v. 1. 354. *Sm. Fl. Brit.* 240. *Prodr. Fl. Græc. Sibth.* v. 1. 143. *Juss.* 165. *Lamarek Illustr.* t. 124. *Gærtn.* t. 30.—Clafs and order, *Pentandria Monogynia.* *Nat. Ord.* *Campanaceæ*, *Linn. Juss.*

Gen. Ch. *Cal.* Perianth superior, of one leaf, in five deep, acute, somewhat spreading segments. *Cor.* of one petal, wheel-shaped, spreading, in five deep, linear, acute, recurved segments. *Stam.* Filaments five, shorter than the corolla; anthers oblong. *Pist.* Germen inferior, roundish; style thread-shaped, the length of the corolla, recurved; stigma in two or three oblong revolute segments. *Peric.* Capsule roundish, membranous, of two or three cells, opening by a fissure at each side. *Seeds* very numerous, small, roundish, smooth.

Ess. Ch. Corolla wheel-shaped, in five deep linear segments. Stigma in two or three segments. Capsule inferior, opening laterally, of two or three cells.

A genus of herbaceous, almost uniformly perennial, mountain or alpine, European plants, with handsome blue flowers; nearly allied to *Campanula*, but with a differently shaped corolla. Willdenow well remarks, that the alpine species, and indeed all that are the produce of the more northern or middle regions of Europe, bear a dense oblong spike, or roundish head; while the oriental ones generally have dispersed flowers. In sensible qualities the genus agrees with *Campanula*; and the herbage, when wounded, discharges a bitter milky fluid. Linnæus has six species in his *Sp. Pl.* and the same number in *Syst. Veg.* ed. 14. Willdenow has sixteen. One only is wild in Britain. Five exotic species occur in *Hort. Kew.* one of them before published by Dr. Sims alone. Three are added to the stock in *Prodr. Fl. Græcæ*, of which one is *Campanula limonifolia* of Linnæus and Willdenow. The alpine species are,

## PHYTEUMA.

are, in many instances, not free from obscurity in their characters and synonyms, as being liable to vary much, according to shade or exposure of situation, in the shape of their leaves, length and figure of their spikes, as well as in their whole habit and dimensions. Hence arises so much obscurity in their determination, that though we have examined not a few in their native stations, and have received some authentic specimens from the authors, who have described them, the difficulty of arranging their synonyms, and defining their limits, seems rather to grow under our hands. We shall attempt to correct some errors, in enumerating a few of the most certain species. There can be no good reason for persevering in the old blunder of making *Phyteuma* of the feminine gender.

*Ph. Scheuchzeri*. Willd. n. 2. Allion. Pedem. v. 1. 116. t. 39. f. 2. (Rapunculus, n. 682; Hall. Hiit. v. 1. 304.)—Flowers in a round head, much exceeded by the long, linear, spreading bractæas. Stem leafy. Leaves linear-lanceolate, toothed, stalked, rough-edged.—Native of the alps of Switzerland and Savoy.—Stem from twelve to eighteen inches high, upright, weak, slender, smooth, simple. Leaves from one to three inches long, scattered, narrow, bluntish, minutely rough at the edges, and beset with glandular distant teeth. Flowers not very numerous, in a perfectly round, solitary, terminal head. Bractæas few, one much longer, and more leafy, than the rest. Style slender, hairy upwards. Style long, three-cleft, revolute.

*Ph. scorzonifolium*. Villars Dauph. v. 1. 519. t. 12. f. 2.—Spike cylindrical. Bractæas short, reflexed. Stem naked above. Leaves linear-lanceolate, toothed, smooth.—Native of the mountains of Dauphiny and Italy. We gathered it on the hill called *la Bocchetta*, above Genoa, in 1787. Willdenow considers this as but a variety of the former, to which he was perhaps led by an assertion of Villars, that it was sent by Allioni as his *Ph. Scheuchzeri*. Here must have been some mistake. The two species are essentially distinct in their inflorescence, and all the rest of the characters indicated above. The spike in our Genoese specimens is in seed, and measures near two inches in length, though only a quarter of an inch in thickness. The stem-leaves are mostly sessile, quite smooth at the edges, numerous about the lower part of the stem, though wanting in the upper. Their teeth are more like ferratures.

*Ph. hemisphericum*. Grafs-leaved Rampion. Linn. Sp. Pl. 241. Willd. n. 4. Ait. n. 1. Jacq. Ic. Rar. t. 333.—Head roundish. Bractæas ovate, pointed. Leaves linear, nearly entire, about as long as the stem.—Native of the alps of Switzerland, Italy, France, and Germany, as well as of the Pyrenees. It has been introduced from time to time into our gardens, but requires the shelter of a frame, like many other alpine productions, that are so long buried in snow in their native stations. The roots are somewhat creeping. Stems from two to six inches high, ascending or curved, concealed by the numerous, chiefly radical, narrow, smooth leaves, which sometimes overtop them, and whose grassy aspect characterises this species. The bractæas are several, shorter than the head, broad, taper-pointed, somewhat membranous, fringed. Two or three of the very earliest leaves are often short and spatulate.

*Ph. comosum*. Glaucous Rampion. Linn. Sp. Pl. 242. Willd. n. 5. Ait. n. 2. Jacq. Auftr. append. 56. t. 50.—Flowers in a terminal leafy tuft. Leaves strongly toothed, smooth, glaucous; the radical ones heart-shaped.—This beautiful species, so remarkable for its very glaucous herbage, and purple inflated flowers, was first found on mount Baldus. It occurs also on the alps of Carniola and the

Tyrol, but scarcely elsewhere. The stem is but three or four inches high. Leaves broad, mostly elliptical. No obscurity attends this plant, of which many figures are to be found in the old authors. We have never seen a garden specimen. The root is biennial.

*Ph. orbiculare*. Round-headed Rampion. Linn. Sp. Pl. 242. Willd. n. 6. Ait. n. 3. Jacq. Auftr. t. 437. Engl. Bot. t. 142.—Head roundish. Leaves crenate; the lowest somewhat heart-shaped; the uppermost sessile, ovate, pointed.—Found on the mountains of Italy and Switzerland, as well as on the chalky hills of Suffex and Surry, being the only British species. It flowers in August, and is perennial. The first or lowest leaves only are heart-shaped; the rest of the radical ones elliptic-oblong; all crenate, veiny, slightly roughish: the stem-leaves are scattered, sessile, small, lanceolate or ovate, taper-pointed. Stem about a foot high, in luxuriant ground twice as much, crowned with a dense head of numerous dark-blue flowers, subtended by several ovate fringed bractæas.—Willdenow subjoins as varieties three species of Villars, which we can scarcely think belong to *orbiculare*, though we have not had an opportunity of seeing more than two of them. *Ph. lanceolatum*, Villars t. 12. f. 1, we have not seen, but the uniformly ovate leaves, all stalked, indicate a strong specific difference from our *orbiculare*. *Ph. ellipticum*, t. 11. f. 2, is still more different, in its short dense hairiness, as well as in its oblong blunt upper leaves, and long leafy bractæas. *Ph. Charmeli*, t. 11. f. 3, is abundantly distinct from all these, in its small, violet-like, heart-shaped, radical leaves, rough with minute points, and supported by capillary footstalks, above five times their own length; as well as in its humble stem, bearing many long, narrow, lanceolate or linear leaves, and the long narrow bractæas which accompany its small dense head of flowers.

*Ph. repandum*. Olympian Rampion. Sm. Prodr. Fl. Græc. Sibth. v. 1. 143.—Spike rather lax. Leaves elliptic-oblong, stalked, wavy, smooth. Stem perfectly simple, almost leafless.—Gathered by Dr. Sibthorp on the summit of the Bithynian Olympus. The root is strong, woody, and perennial, producing many tufts of leaves not unlike those of *Globularia nudicaulis*, but less coriaceous, and somewhat wavy at the margin. Stems solitary, erect, straight, two, three, or four inches high, smooth, bearing one or two distant leaves. The footstalks are all fringed at the base. Flowers blue, in a solitary, erect, lax spike, the lower ones often in pairs, and sometimes very remote. Bractæas linear-lanceolate, fringed. This species is no where figured.

*Ph. ellipticum*. Elliptical Mountain Rampion. Sm. Prodr. Fl. Græc. Sibth. v. 1. 143. Fl. Græc. t. 217. unpubl. (*Ph. campanuloides*; Sims in Curt. Mag. t. 1015. Ait. n. 5.)—Spike rather lax. Leaves elliptical, stalked, crenate, rough. Stem perfectly simple, leafy, hairy.—Native of the Bithynian Olympus and of mount Caucasus. The root is somewhat creeping. Stems in the wild plant, from six to twelve inches high, erect, more or less rough with hoary dense hairs, and bearing many elliptic or ovate, strongly crenate, roughish leaves, about an inch and a half long, on fringed footstalks of various lengths. Flowers deep blue, in a terminal bracteated spike, extremely variable in length and luxuriance. In a garden, it seems, the stem becomes smooth, and the spike racemose, with ternate flowers, which last character occasionally presents itself likewise in wild specimens. Dr. Sibthorp's figure, with about seven flowers, and that in the Botanical Magazine, exhibit the two extremes of the inflorescence. Our specimens account for the appellation of *canescens*, under which Mr. Loddiges received the plant; and it is much to be wished that our

specific name, antecedent to that in the Magazine, might also take place of the probably unpublished Flora Taurica, *campanuloides* being liable to several objections.

*Ph. betonicifolium*, Villars Dauph. v. 2. 518. t. 12. f. 3; *spicatum*, Linn. Sp. Pl. 242. Fl. Dan. t. 362; and *ovatum*, Willd. n. 10, which last is Haller's *Rapunculus* n. 683, are sufficiently defined in Willdenow, nor does any obscurity attend these species.

*Ph. limonifolium*. Sea-lavender Rampion. Sm. Prodr. Fl. Græc. Sibth. v. 1. 144. Fl. Græc. t. 218, unpubl. (*Campanula limonifolia*; Linn. Sp. Pl. 239. Willd. Sp. Pl. v. 1. 914. *C. orientalis*, *limonii minimi facie*, flore patulo; Tourn. Cor. 3.)—Leaves lanceolate, roughish with reversed hairs, wavy, and somewhat toothed. Stem panicled. Flowers sessile, about three together.—Gathered by Tournefort in the Levant; by Sibthorp in grassy places towards the summit of the Bithynian Olympus. The root is very thick and woody, crowned with numerous tufts of narrow, bluntnish, long-stalked, spreading leaves, about three inches long, and half an inch wide, of a bright green; their short rigid pubescence directed backwards, or towards the base; their margin either toothed or waved. Stems about a foot high, erect, round, smooth, leafy, copiously branched in an alternate manner; their branches spreading, leafless, beset with many smallish, blue, sessile flowers, two or three together, having yellow anthers, and a rough, reddish, club-shaped style.

*Ph. lobelioides*. Willd. n. 12. Phytogr. fasc. 1. 6. t. 4. f. 2. (*Rapunculus orientalis*, *hesperidis folio*; Tourn. Cor. 4.)—Leaves linear-lanceolate, somewhat toothed, rough. Stem panicled. Flowers stalked, feathered.—Gathered by Tournefort in America. It is very remarkable that so great a *corollifol* should have separated this plant generically from the last, their flowers agreeing so exactly in the depth of their segments. Indeed they come so near in specific characters, that but for the different distributions of their flowers, which seems constant, we could hardly have distinguished them.

*Ph. amplexicaule*. Toothed Rampion Willd. n. 15. Sm. Fl. Græc. Sibth. t. 219, unpubl. (*Rapunculus orientalis*, *campanule pratensis folio*; Tourn. Cor. 4.)—Leaves ovate, pointed, strongly and doubly serrated, smooth; slightly heart-shaped, and clasping the stem. Cluster leafy, somewhat panicled.—Gathered by Dr. Sibthorp, in grassy spots, near the top of the Bithynian Olympus. A very handsome species, twelve or eighteen inches high, smooth and unbranched, with numerous, alternate, strongly and sharply serrated, or toothed, leaves, about two inches long. Flowers large, bright blue, vying in beauty with the following, but far less numerous.

*Ph. pinnatum*. Winged-leaved Rampion. Linn. Sp. Pl. 242. Willd. n. 16. Ait. n. 6. Venten. Jard. de Cels. t. 52. Sm. Fl. Græc. Sibth. t. 220, unpubl. (*Rapunculus creticus*, feu *Pyramidalis altera*; Tourn. Inf. 113. *Petro-marula* di Candia, overo *lattuca petrea*; Pou. Bald. 96. Imperati Hist. Nat. 668.)—Leaves pinnate. Panicle cylindrical, branched, many-flowered.—Very common on the rocks and mountains of Crete, but does not appear to be found wild any where else. Parkinson is said to have cultivated this beautiful plant in 1640; but it had long been lost to our collections, till Dr. Sibthorp brought seeds, which produced flowering plants at Dr. Pitcairn's, Inslington, from whom we obtained a specimen in 1791, there being none previously in the Linnaean herbarium. The wooden cuts of Pona and Imperati are good and original; but the best history of the plant is given, from Honorius Belli's letter to

Clasius, by the former. This all writers have copied, and Ventenat attributes the credit of some of it to J. Bauhin, who certainly has nothing original on the subject. Ventenat also errs, in his own observation, when he says the simple stigma disagrees with the character of *Phyteuma*. But this part, though drawn simply capitate in his plate, is truly three-cleft, as drawn by Bauer. The root is perennial, thick and milky, eaten, like that of *Campanula Rapunculus*, being suffused of an aphrodisiac quality. The first leaves are simply heart-shaped, like those of violets; the rest pinnate, sometimes interruptedly, a span long, smooth, deeply serrated; pale, and often purplish, beneath; their terminal leaflet heart-shaped, the rest obliquely ovate, stalked. Flowers very abundant, in a long, erect, terminal, dense, panicle, with cymose branches; their stalks glaucous and purplish; their corolla and stamens of a lilac hue.

PHYTOLACCA was first so called by Tournefort, from *φύλλον*, a plant, and *lacca*, a barbarous word, designating a kind of colouring substance; see LAKE or LAQUE; because the berries of several species of this genus afford a beautiful, though not lasting, purple or crimson dye.—Tourn. t. 154. Linn. Gen. 233. Schreb. 313. Willd. Sp. Pl. v. 2. 822. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 3. 139. Sm. Prodr. Fl. Græc. Sibth. v. 1. 318. Jul. 84. Lamarek Illustr. t. 393. Gært. t. 77.—Class and order, *Decandria Decagynia*. Nat. Ord. *Holeraceae*, Linn. *Atriplices*, Juss.

Gen. Ch. Cal. inferior, of five roundish, concave, spreading, coloured, permanent leaves, inflexed at the summit. Cor. none. Stam. Filaments ten, or eight, or twenty, awl-shaped, the length of the calyx; anthers roundish, lateral. Pist. Germen superior, orbicular, depressed, marked with alternate furrows and ribs; crowned with ten, or eight, or five, or seven, very short, spreading, reflexed styles; stigmas simple, permanent. Peric. Berry orbicular, depressed, furrowed, with ten, or eight, or five, or seven, cells, the summit hollowed, lodging the styles. Seeds solitary in each cell, kidney-shaped, smooth.

Obs. *Ph. dioica* has the flowers of distinct sexes, on different plants. Linnaeus having now fixed the place of this genus, amongst his *Holeraceae*, not *Miscellanea*, it becomes necessary to reform his generic character, as to the flower having a calyx, not a corolla, on which subject he speaks with doubt in his Gen. Pl.

Ess. Ch. Calyx of five coloured leaves. Corolla none. Berry superior, of five or ten cells, and as many seeds.

The genus before us is remarkable for having all its specific differences depend on the number or situation of the organs of impregnation; so that, strictly speaking, every species belongs to a different class or order of the artificial system. No genus, notwithstanding this irregularity, can be more natural. Linnaeus knew but four species; Willdenow has six, five of them in the gardens of England. It is worthy of remark, that the two new species, discovered since Linnaeus wrote, differ in the number of their stamens and styles from each other, as well as from all those originally described, so as to preserve the unity of the principle according to which they are all discriminated.

1. *Ph. oaxandra*. White-flowered Phytolacca, or Poke-weed. Linn. Sp. Pl. 631. Willd. n. 1. Ait. n. 1. (*Ph. mexicana*, baccis sessilibus; Dill. Elth. 218. t. 239. f. 308. Sjoorikiu, vulgò *Jamma Gobò*; Kämpf. Amoen. 828. t. 829.)—Stamens and styles eight.—Native of Mexico, as well as of Japan. The root is perennial, long and fleshy, according to Kämpfer eatable, and like a turnip. Stem herbaceous, thick, fleshy, alternately branched, leafy, smooth,

smooth, from three to six feet high. *Leaves* alternate, ovate, with a glandular point, smooth, wavy, veiny, resembling those of a *Rumex* or *Beta*, on thick stalks. *Flowers* white, numerous, in dense, cylindrical, terminal, solitary spikes. *Berries* sessile, black, the size of a large pea. The whole plant has a coarse rank habit, like a dunghill herb, and smells unpleasantly when bruised.

2. *Ph. striata*. Erect Phytolacca. Willd. n. 2. Hoffm. Comm. Goett. v. 12. 27. t. 3. (*Ph. heptandra*; Retz. Obs. fasc. 6. 29.)—"Stamens eight. Styles seven. Leaves lanceolate, pointed."—Native of America. We have seen no specimen. Retzius describes it as follows. *Root* perennial. *Stem* two feet high, branched, erect, striated, smooth, hollow. *Leaves* scattered, stalked, lanceolate, entire, smooth, an inch and a half long. *Flowers* racemose, with several small awl-shaped bractees, at or near the base of their partial stalks. *Calyx* white within. *Stamens* seven. *Styles* six. *Berries* yellow, pellucid, of six distinct lobes, or grains. Hoffmann and Willdenow both give the number of *stamens* and *styles* as above.

3. *Ph. abyssinica*. African Phytolacca. Willd. n. 3. Ait. n. 2. Hoffm. Comm. Goett. v. 12. 28. t. 2. (*Ph. dodecandra*; L'Herit. Stirp. 143. t. 69.)—"Stamens ten. Styles five. Said to have been brought from Abyssinia, by Mr. Bruce, in 1775. It is a shrub, kept in the stove, and flowering in May and June. *Stem* six feet high. *Branches* slender and spreading. *Leaves* stalked, spreading, ovate, wavy, tipped with an acute, reflexed, channelled point. *Clusters* long, drooping, downy, of many greenish downy flowers. *Berry* deeply lobed, red, with orange-coloured juice. L'Heritier found the *styles* and *seeds* most commonly but five; the *stamens* usually fifteen. Both are acknowledged to be variable. Our garden specimen, in the collection of the younger Linnæus, bears the name of *Ph. scandens*, which we find no where in print, nor does it seem to agree with the character of the shrub.

4. *Ph. decandra*. Common Phytolacca, or Virginian Poke-weed. Linn. Sp. Pl. 631. Willd. n. 4. Ait. n. 3. Curt. Mag. t. 931. Mill. Illustr. t. 36. —Stamens and styles ten.—Native of America, now naturalised in Spain, Portugal, Barbary, Zante and Greece. With us it is a tolerably hardy perennial, flowering from July to the end of autumn, forming a large herbaceous bush, decorated at once with clusters of greenish-white flowers and dark purple berries. The latter are said to have sometimes served in Portugal to improve the colour of such red port as is compounded in that country, not in England.

5. *Ph. icofandra*. Red Phytolacca. Linn. Sp. Pl. 631. Willd. n. 5. Ait. n. 4. (*Ph. spicis florum longissimis*, radice annua; Mill. Ic. v. 2. 138. t. 207.)—"Stamens twenty. Styles ten.—Native of the East Indies. Annual with us, if planted abroad; but perennial in a stove, flowering in autumn. The *stem* is herbaceous, three or four feet high. *Leaves* rather narrower than in the last. *Clusters* erect, long, and taper-pointed, of numerous bluish-coloured flowers, the lowermost of which, Linnæus says, have certainly twenty *stamens*. By Miller's account the generality have much fewer. *Berries* dark purple, on rather short partial stalks.

6. *Ph. dioica*. Tree Phytolacca. Linn. Sp. Pl. 632. Willd. n. 6. Ait. n. 5. L'Herit. Stirp. 145. t. 70.—Flowers dioecious, with many stamens.—Native of South America. Miller cultivated this species in 1758, and L'Heritier says it is extremely common in European gardens. The Hortus Kewensis marks it as a stove shrub, without any mention of its flowering. The *stem* is thick, ten or twelve feet high, with round smooth leafy branches.

*Leaves* precisely ovate, pointed, smooth, entire, on long stalks. *Clusters* drooping, somewhat downy. *Flowers* greenish-white; the female ones smallest. *Berries* large, crowded, pale, much depressed and umbilicated.

The *leaves* of all the species that we have seen terminate in an awl-shaped, channelled, pale or coloured, somewhat glandular point, or appendage, which seems characteristic of the genus.

PHYTOLACCA, in *Gardening*, affords plants of the herbaceous hardy kinds, of which the species cultivated are; the white-flowered phytolacca (*P. octandra*); the branching phytolacca, or Virginian poke (*P. decandra*); the red phytolacca (*P. icofandra*); and the tree phytolacca (*P. dioica*).

The first sort is in some places found a palatable wholesome green: the tender stalks being frequently served up as young asparagus.

Also, in some places the young shoots of the second sort are boiled and eaten as spinach.

The fruit in the third sort is a globular berry.

*Method of Culture*.—The three first sorts may be increased by seeds, which should be sown in pots, in the spring, and plunged in a moderate hot-bed; when the plants have had a few inches growth, they should be removed into separate pots in the first and third sorts, but in the second into the borders or other parts, allowing them good room. The two former may be set out in warm borders or other places during the summer in pots, being carefully watered, shaded, and kept free from weeds.

The fourth sort may be raised by planting cuttings in the summer season, in pots filled with light earth, plunging them in the bark hot-bed and covering the pots with hand-glasses, proper shade being given. When well rooted, they should be removed into separate pots of a small size, replunging them in the hot-bed with proper shade till rooted, when they should be gradually inured to the open air, being removed into a moderate stove during the winter season.

The first sorts afford ornament and variety among potted plants of the stove kind; and the second sort, in the borders of the natural ground.

PHYTOLOGI, PHYTOLOGISTS, authors who have written any treatise on botany, or the history or uses of vegetables.

PHYTOLOGY, *φυτολογία*, compounded of *φυτοι*, *plant*, and *λογος*, *discourse*, of *λεγω*, *I describe*, or *rehearse*, a discourse upon plants, or a description of their forms, kinds, properties, &c.

PHYTOTOMA, in *Ornithology*, a genus of birds of the order Passeres. The generic character is; bill conic, straight, serrate; nostrils oval; tongue short and obtuse; feet four-toed. There is but a single species; *viz.*

RARA, which inhabits Chili, about the size of a quail; it has a harsh interrupted cry, resembling the syllables *ra ra*; it feeds on fresh vegetables, which it cuts down near the roots with its bill as with a saw, and is, on account of the mischief which it does to gardens, detested by the natives: it builds in high shady trees in retired places; the eggs are white, spotted with red. The bill of this bird is thick, and about half an inch long, toothed on each side like a saw; the irides are brown; the body above is of a dusky ash, beneath it is paler; the quill and tail-feathers are spotted with black; tail rounded; the hind toes shorter than the fore ones.

PHYZANIA, in *Ancient Geography*, the name of a country of Africa, according to Ptolemy.

**PIA MATER**, in *Anatomy*, one of the coverings of the brain. See **BRAIN** and *NERVOUS System*.

**PIABA**, in *Ichthyology*, the name of a small fresh-water fish, caught in all the rivers and brooks in the Brasils, and some other parts of America.

It is of the size of the common minow; is a well-tasted fish, and much esteemed by the natives.

**PIABUCU**, the name of an American fish eaten by the natives in many places. It is a ravenous fish, and so greedy of blood, that if a man goes into the water with a wound in any part of his body, this fish will make up to it to suck the blood: it is a small fish, seldom exceeding four inches in length. See *SALMO Argentinus*.

**PIACENZA**, in *Geography*. See **PLACENTIA**.

**PIACHE**, **PIAZZA**, a covered arched walk, or portico. See **PORTICO** and **PIAZZA**.

**PIADA**, in *Ancient Geography*, a town of Asia, in Serica, between Damna and Aimiræa. Ptolemy.

**PIADELLA**, in *Geography*, a town of Italy, in the department of the Lario; 20 miles N. of Como.

**PIADENA**, a town of Italy, in the department of the Mincio; 16 miles W. of Mantua.

**PIAFFEUR**, in the *Manege*, is a proud, stately horse, being full of mettle, or fire, restless and forward, with a great deal of motion, and an excessive eagerness to go forwards, makes this motion the more that you endeavour to keep him in, and bends his leg up to his belly. He snorts, traverses if he can, and by his fiery action shews his restlessness; whence some, though very improperly, say, he dances.

Such horses as these, or such as are bred to passage upon a straight line, are much admired in carousals and magnificent festivals. See **SNORT**, and **PASSADE**.

**PIALAPOUR**, in *Geography*, a town of Bengal; 20 miles N. of Dacca. N. lat.  $23^{\circ} 35'$ . E. long.  $90^{\circ} 8'$ .

**PIALITZ**, a river of Russia, in the government of Archangel, on the coast of the White sea, near Pialitza. N. lat.  $66^{\circ} 10'$ . E. long.  $37^{\circ} 44'$ .

**PIALITZA**, a town of Russia, in the government of Archangel, on the coast of the White sea; 100 miles N. of Archangel.

**PIAL-ÛL-GEEL**, a town of Prussia, in the circle of Natangen; 10 miles E. of Lick.

**PIALZY**, a town of Hindoostan, in the country of Dindigul; 23 miles W.N.W. of Dindigul. N. lat.  $10^{\circ} 28'$ . E. long.  $17^{\circ} 37'$ .

**PIANA**, a town of the island of Corsica; nine miles N.W. of Vico.—Also, a river of Russia, which runs into the Sura, near Yadrin, in the government of Kazan.—Also, a small island near the N. coast of Sardinia. N. lat.  $41^{\circ}$ . E. long.  $8^{\circ} 27'$ .—Also, a small island near the W. coast of Sardinia. N. lat.  $39^{\circ} 17'$ . E. long.  $8^{\circ} 25'$ .—Also, a small island in the Mediterranean, near the coast of Naples. N. lat.  $40^{\circ} 13'$ . E. long.  $12^{\circ} 55'$ .

**PIANEG**, a town of Russia, in the government of Viatka; 16 miles E.N.E. of Yarensk.

**PIANELLO**, a town of the island of Corsica; 18 miles E. of Corte.

**PIANEZZA**, a town of France, on the Dora; four miles W. of Turin.

**PIANISSIMO**, in the *Italian Music*. See **PIANO**.

**PIANKANSHAWS**, or **PYANKESHAWS**, *Vermilions* and *Muscontins*, in *Geography*, are tribes of Indians in the Indiana territory, who reside on the Wabash and its branches, and Illinois river. These, with the Kickapoos, Musquitos, and Ouatanons, could together furnish about 1250 warriors, in the year 1780.

**PIANKATUNK**, a small river of Virginia, which runs E. into Chesapeake bay, opposite to Gwin's island; navigable eight miles for small craft.

**PIANO**, a town of Italy, in the department of the Panaro; 16 miles S.W. of Modena.

**PIANO della Corte**, a town of Naples, in Principato Citra; 12 miles N.N.W. of Cangiano.

**PIANO Picola**, a town of Naples, in Capitanata; two miles W. of Vieste.

**PIANO**, an Italian musical term implying soft, with a subdued voice, was at first only used in repeating short passages in the way of echo. It was no otherwise used by Corelli. At present its use is extended to whole periods in the way of chiaro-scuro, and contrast to *forte*, loud, in every degree of comparison. It is abridged to *pia*, and the initial letter P., as is its superlative degree, *pianissimo*, to *pianiss*, and *pp*. Sometimes *pp*. stands for *pian piano*, when it has somewhat more force.

**PIANO Forte**, a keyed instrument, of which the tone is produced by hammers instead of quills, like the virginal, spinet, and harpsichord. There is a minute account of the invention, and a description of the piano forte, in the "Giornale d'Italia," tom. v. p. 144, printed at Venice, 1711. This instrument was invented at Florence, by Bartolommeo Cristofali, harpsichord maker, a native of Padua, in the service of the grand duke of Tuscany. For the history of the piano forte, see **HARPSICHORD**.

**PIANOSA**, in *Geography*, a small island in the Mediterranean, near the coast of Etruria, anciently called "Plunatia," and used as a place of exile. Its flat surface is a league in extent, elevated only a few feet above the level of the sea; an uncultivated rock, abandoned to wild goats; dangerous to navigators in the night; seven miles S.S.W. from the island of Elbe. N. lat.  $42^{\circ} 42'$ . E. long.  $10^{\circ} 15'$ .

**PIAPET**, or **MAGPIE**, in *Ornithology*. See **CORVUS Pica**.

**PIAPIS HARBOUR**, in *Geography*, a port on the N. coast of the island of Waygoo, on the Equator. E. long.  $130^{\circ} 45'$ .

**PIAQUEMINES**, a river of Louisiana, which runs into the Missouri, N. lat.  $38^{\circ} 25'$ . W. long.  $91^{\circ} 37'$ .

**PIARANTHUS**, in *Botany*, from  $\pi\alpha\rho\alpha\iota\varsigma$ , *fat* or *thick*, and  $\alpha\beta\alpha\iota\varsigma$ , *a flower*, a genus separated by Mr. R. Brown from *Stapelia*, because it wants the external crown. Brown Tr. of the Wernerian Society, v. 1. 23. Clafs and order, *Pentandria Digynia*. Nat. Ord. *Contortæ*, Linn. *Apocinea*, Juss. *Aselepiadeæ*, Brown.

Ess. Ch. Corolla bell-shaped, five-cleft, fleshy, including the column of fructification. Crown of the stamens single, of five leaves, toothed at their back. Anthers simple at the summit. Masses of pollen erect, attached by the base, cartilaginous and pellucid at one edge. Stigma pointless. Foli-  
cles . . . . .

There are but two certain species.

1. *P. punctatus*. (*Stapelia punctata*; Masson Stapel. 18. t. 24. Willd. Sp. Pl. v. 1. 1289. Ait. Hort. Kew. v. 2. 92.)—Branches decumbent, jointed. Flower-stalks axillary, longer than the corolla. Found by Mr. Masson in the Namaqua lands, at the Cape of Good Hope. He sent it to Kew in 1795, and it flowers there, in the dry stove, during most part of the autumn. The joints of the branches are obovate, squarish, of a dark glaucous green, beset with numerous prominences, each of which is tipped with a brown tooth. *Flower-stalks* axillary from the prominences, several together, an inch and a half long, smooth, purplish, single-flowered. *Flowers* about an inch wide; internally pink,

pink, dotted with minute crimson tubercles: externally whitish; the segments spreading, acute.

2. *P. pullus*. (*Stapelia pulla*; Maffon Stapel. 21. t. 31. Willd. Sp. Pl. v. 1. 1288. Ait. Hort. Kew. v. 2. 92.) —Branches erect, with about six angles. Flower-stalks lateral, shorter than the corolla. Discovered by Mr. Maffon in the hot sandy region of Karrò in southern Africa. He introduced it at Kew so early as 1774, and it flowers in August and September in the dry stove. The stems or branches form a thick tuft, about a span high, of a light green, slightly glaucous; their angles beset with strong brown teeth. Flowers two or three together, on short simple stalks, from the sides of the branch, remote from the teeth. Corolla about an inch long, slightly spreading, acute; dark brown within; whitish, with five purple ribs, without; the edges revolute.

These plants so precisely accord with various *Stapelia* in every point of habit, that we should presume the singleness of the crown can afford no legitimate generic distinction, any more than the difference between five and ten flames in *Cerastium*, the want or presence of a nectary in *Tilia*, and other similar cases.

PIASANSKOL, NIZNEI, in *Geography*, a town of Russia, in the government of Tobolsk, near the Frozen sea. N. lat. 69° 16'. E. long. 87° 14'.

PIASANSKOL, *Verbnei*, a town of Russia, in the government of Tobolsk, near the Frozen ocean. N. lat. 68° 30'. E. long. 87° 14'.

PIASKY, a town of Poland, in the palatinate of Lublin; 12 miles E.S.E. of Lublin.

PIASTER, or PIASTRE, a Spanish money, more ordinarily called a *piece of eight*.

PIASTLA, in *Geography*, a town of Mexico, in the province of Chiametlan, on the river Piaftla, which runs into the Pacific ocean, N. lat. 23° 25'. The town is situated at the distance of 50 miles N.W. of Chiametlan.—Also, a town of Mexico, in the province of Gualteca; 15 miles S. of Panuco.—Also, a town of Mexico, in the province of Tlafcala; 55 miles S. of Puebla de los Angeles.

PIASTRE, in *Commerce*. See PIASTER, or PIECE of eight.

PIASTRE is also a money of account and silver coin in Turkey, and the Levant. The piastre of Aleppo, and of its port, Alexandretta or Scanderoon, is accounted at 80 aspers, or 24 syanos. The piastres of Alexandria are valued at 40 medini, each medino being subdivided into 8 borbi, or 6 forli, or 3 aspers. The piastre at Algiers is the same with the *pataca gowda*, which see. At Grand Cairo accounts are kept, by European merchants, in piastres of 40 medini; but the Levanters reckon only in medini.

Constantinople and the whole of Turkey keep accounts in piastres, commonly called grouch by the Turks, and by the English, dollars. Each piastre is divided into 40 paras, and each para into three aspers. These are real coins; but the piastre is also sometimes divided into 80, and sometimes into 100 imaginary parts, called aspers or minas. A jux or juck is a sum of 100,000 real aspers: a chise or purse is 500 ditto. The gold coin, called sequin fondueli, was coined in 1764; 100 of these weigh 5415 English grains, and they are about 23 carats fine; it passed at first for 3½ piastres, or 440 aspers, but its price was gradually raised to four piastres; and in 1769 most of them were called in for a new coinage. The dollar or piastre is a silver coin of 40 paras. By the regulations of 1780, the purse of 500 piastres was to weigh 2812½ Turkish drams, so that a single piastre weighed 5½ drams, or 277 English grains, and the other pieces in proportion. The standard

of fineness was reduced at the same time to 50 carats (or hundredth parts) of fine silver, and 50 of alloy; which gave the value of the piastre at 19¼d. sterling, and the other silver coins in proportion. But since that period the Turkish have suffered a deterioration. Dr. Kelly, the author of the Universal Cambist, has caused a piastre of the latest coinage to be weighed and assayed, by the king's assay-master of the mint, and the report is as follows: weight, 8 dwt. 6 gr. Fineness, 5 oz. 6 dwt. worse than the English standard. This gives its fineness 47 carats 2 grains Turkish, and its value in sterling 13½d. Venetian sequins pass at present for 9½ piastres; Dutch, Imperial, and Hungarian ducats, for 9 piastres; Spanish dollars, and German six-dollars or Imperial tallaris (called by the Turks cara grouch) for 4½ piastres.

Damascus keeps accounts in piastres of 80 aspers like Aleppo, and has the same coins as Constantinople. Smyrna keeps accounts in piastres or dollars; which the English and Swedes reckon at 80 aspers; the Dutch, French, and Venetians at 100; and the Turks, Greeks, Persians, and Armenians, at 120 aspers. This piastre (called by the Turks grouch) is also divided into 12 temins, and 40 paras or medini. Tripoli keeps accounts in piastres, of 13 grimellini, or 52 aspers. The grimellini is valued at 6 fous Tournois, which makes the piastre of Tripoli worth 3s. 3d. sterling. At Tunis accounts are kept in piastres, of 52 aspers; each asper being divided into 12 borbes.

The assay, &c. of the Turkish piastres is as follows:

	Assay.	Weight.	Contents in pure Silver.	Value in Sterling.
	oz. dwt.	grs.	grains.	s. d.
Piastre of Mustafa III. (1757)	W. 4 11	0 12 7	161	1 10½
Piastre of Abdul Hamed (1773)	W. 5 2	0 12 7	147.5	1 8½
Another of the same period	W. 4 9	0 12 0	159.6	1 10¼
Double piastre of Selim (1789)	W. 5 12	0 16 22½	186.4	2 2
Piastre of Selim (1801)	W. 5 6	0 8 0	96.7	1 1¼
Half piastre	W. 6 13	0 4 1	35.9	0 5
Piastre of Crim Tartary (1778)	W. 6 13	0 10 5	91.9	1 0¾
Piastre of Tunis (1787)	W. 6 5½	0 10 0	96.5	1 1½

N.B. W. denotes worse than English standard.

The piastre and other silver coins bear the same inscriptions as the gold coins, and the same differences exist in them. The inscriptions on the single, double, and half piastres of Selim of 1789 are similar to those on the sequin fondueli of this prince, which has on one side, *Sultan Selim, son of Mustafa Khan*, and on the reverse, *Struck at Slambul*, in the year 1203, being the date of the Hegira, which began in 622 of the Christian era. The piastre of Tunis bears on one side the words, *Sultan of the two lands, and sovereign of the two seas, Sultan Selim Khan, blest with victory*: and on the reverse, *Struck at Tunis*, in the year, &c. See Kelly's Universal Cambist.

PIASTRE is also the French for a dollar; which see.

PIASTRINE. See PISTEREEN.

PIAT SOPOK, in *Geography*, a cluster of five islands, among

among the Fox islands, in the North Pacific ocean. N. lat.  $53^{\circ} 24'$ . E. long.  $189^{\circ} 46'$ .

PIATEK, a town of Samogitia; 15 miles N.N.E. of Miedniki.

PIATEK, or *Piontek*, or *Prontko*, a town of the duchy of Warfaw, celebrated for its beer; eight miles N.N.E. of Lencicz.

PIATIA, a town of Naples, in Calabria Ultra; eight miles S.W. of Gierace.

PIATIGER, a town of Russia, in the government of Viatka; 16 miles E. of Kai.

PIATNITZKA, a town of Russia, in the government of Tobolsk; 28 miles N.N.W. of Eniseisk.

PIATTA, a town of Italy, in the county of Bormio; two miles S. of Bormio.

PIATTI. See PATTI.

PIATZINA, a town of Russia, in the government of Olonetz; 32 miles N.W. of Kargopol.

PIAUBAU, in *Ornithology*. See MUSCICAPA *Rubricollis*.

PIAVE, in *Geography*, a river which rises in the Tyrol, crosses the Feltrin and Trevisan, and runs into the Adriatic; 16 miles N.E. of Venice.

PIAVO, a lake of Russia, in the government of Archangel. N. lat.  $66^{\circ} 30'$ . E. long.  $30^{\circ} 14'$ .

PIAW, a river of Mexico, which runs into the bay of Honduras, N. lat.  $15^{\circ} 52'$ . W. long.  $85^{\circ} 50'$ .

PIAZIDA, a river of Russia, which rises in lake Piazinskoi, in the government of Tobolsk, N. lat.  $69^{\circ} 40'$ . E. long.  $89^{\circ} 14'$ , and runs into the Kargskoi sea, at Verchnei Piazinskoi. N. lat.  $73^{\circ} 30'$ . E. long.  $87^{\circ} 14'$ .

PIAZZA, a town of Naples, in Principato Citra; 14 miles E.N.E. of Salerno.—Also, a town of Sicily, in the valley of Noto, situated nearly in the centre of the island, and containing 18,000 inhabitants; 25 miles N. of Alicata. N. lat.  $27^{\circ} 23'$ . E. long.  $14^{\circ} 22'$ .

PIAZZA, in *Building*, properly called *piache*, an Italian name for a portico, or covered walk, supported by arches. The word literally signifies a broad open place, or square; whence it also became applied to the walks, or porticos around them. See PORTICO.

PIAZZOLA, in *Geography*, a town of Corfica; 3 miles E.S.E. of La Porta.

PIBERSTAIN, a town of Austria; 10 miles W. of Freystatt.

PIBGORN, Welsh. See HORNSPIPE.

PIBIGGA, in *Geography*, a town of Hindoostan, in Bahar; 35 miles S.W. of Patna.

PIBRAC, a town of France, in the department of the Upper Garonne; 9 miles W. of Toulouse.

PIC, or ΠΙΚΕ, in *Commerce*, a long measure in Turkey, which at Aleppo is equal to 299.8 French lines, or  $26\frac{1}{2}$  English inches. At Constantinople it is of two sorts: the longest, called Halebi, or Archim, with which silks and woollens are measured, is 314 French lines, or  $27\frac{1}{4}$  English inches in length; the other, called Endassé, with which cotton goods and carpets are measured, is 3 per 100 shorter. But in the general course of European trade the pike is reckoned at  $\frac{1}{4}$ th of an English yard. But in different places it is of different lengths. In the isle of Cyprus the pic or ell measures  $26\frac{3}{4}$  English inches. At Damascus it is  $22\frac{1}{2}$  English inches. The Morocco pic, or pic Morisco is  $26\frac{1}{2}$  English inches; so that 108 pics = 79 English yards. The long pic of Algiers is  $24\frac{1}{2}$  English inches, and the short pic = 18.4 inches. The pic of Candia is 25.1 English inches; that of Corfu, 22.6; that of Jerusalem, 27; that of Negropont, 23.4; that of Oran, 27;

that of Rhodes, 29.7; the long pic of Scio, 27, and the short, 26; that of Sidon, 23.8; that of Smyrna, 27; that of Tripoli, 27; the woollen pic of Tunis, 26.5; the silk ditto, 24.8; and the linen ditto, 18.6 English inches.

PIC de l'Etoile, *Le*, in *Geography*, a small island in the South Pacific ocean, so named from its resemblance in form to a fugar-loaf, by M. Bougainville in 1768. It is one of the group called by Quiros "Terra Austral del Spiritu Santo," by Bougainville "the Archipelago of the Great Cyclades," and by Cook "New Hebrides." S. lat.  $14^{\circ} 29'$ . E. long.  $168^{\circ} 9'$ .

PIC Lamanon, a mountain on the W. coast of the island of Saghalién, so called by Peroufe. N. lat.  $48^{\circ} 40'$ .

PIC Martiniere, a mountain on the W. coast of Saghalién, so called by Peroufe, after the name of a French botanist, the companion of his voyage, on account of the great number of curious plants found there.

PIC de Luco, a town of the duchy of Spoleto; 16 miles S.S.E. of Spoleto.

PIC-beuf, in *Ornithology*. See BUPHAGA *Africana*.

PIC de Cayenne, *Petit*. See YUNX *Minutissima*.

PIC Noir, &c. &c. See PICUS.

PICA, or ΠΥΕ, in *Ecclesiastical Antiquity*, was a term formerly used in the same sense with *ordinal*, for a table or directory, pointing out the order in which the devotional services appointed for different occasions were to be performed. Accordingly some derive it from ΠΙ, a contraction of πινυξ, a table; and others from *litera picata*, a great black letter at the beginning of some new order in the prayer. In much the same sense the term was used by officers of civil courts, who called their calendars or alphabetical catalogues directing to the names and things contained in the rolls and records of their courts, the *Pyes*.

PICA, in *Geography*, a river of South America, which runs into the Pacific ocean, forming a harbour at its mouth. S. lat.  $20^{\circ} 12'$ .

PICA de Regalados, a town of Portugal, in the province of Entre Duero e Minho; 5 miles N.N.E. of Braga.

PICA, in *Medicine*, called also *malacia*, and by the Greeks κίττα, *citta*, signifies a depraved state of the appetite, which induces the patient to crave and swallow unusual and indigestible things, such as chalk, ashes, coals, pitch, salt, cinders, &c. Why the appellation of *pica* was given to this morbid appetite we know not: some writers assert that the bird called *pica* (the pic) is subject to the disease.

This morbid longing for uneatable substances occurs principally in women, and that under two conditions of the uterine system; namely, in a state of chlorosis, in the unimpregnated female, and in the early months of pregnancy. The proximate cause of the deranged appetite is, doubtless, a morbid state of the stomach and its secreted fluids, which we know to be commonly produced by the sympathy with the uterus in the early period of pregnancy in general, and to accompany the chlorotic condition. It has been supposed that the prevalence of an acid in the stomach occasioned this demand for earthy and absorbent substances: but many of the substances, taken in different instances, are not possessed of any antacid qualities. The disorder is very frequently beyond the power of medicine to relieve in a direct way. In the case of pregnancy, it commonly ceases altogether about the fourth month, and has been relieved by blood-letting in strong and plethoric women: but in chlorotic girls it is only removed by the course of medicine, which removes the morbid state of the habit in general, and restores the natural discharge where that was suspended. See CHLOROSIS.

PICA Nafi, a name given by Cohaufen to the immoderate taking

taking of snuff. It seems a whimsical term, but he chooses to treat this habit as a disease, and has written an express treatise concerning it. The word *pica*, in general, denotes an absurd and unnatural appetite; and the desire of taking the powder of tobacco in this manner is called a distempered appetite of the part into which it is taken, that is, the nose.

The consequences of the taking snuff immoderately, are, that the sense of smelling is either entirely destroyed, or at least greatly impaired: for the nervous tubercles of the nostrils being continually vellicated by this powder, are by degrees clogged up, or wholly destroyed, and the sensible membrane, which lines the nostrils, is rendered callous, and wholly unfit for the discharge of its office in smelling. The voice is next affected by this powder; for it causes a sort of stricture at the bottom of the nose, which affects the palate, and consequently the speech; this gives the person who takes it a continual desire of taking more and more, to rid himself of that stoppage.

PICA, in *Ornithology*, the *Magpie*, a species of *Corvus*; which see.—Also, a species of *Alca*, the black-billed auk of Pennant and Latham. See ALCA.

PICA is also a name by which some have called the *lanius*, or *butcher-bird*. See LANIUS.

PICA *Brafilienfis*. See MEROPS *Brafilienfis*.

PICA *Glandaria*, the *Jay*. See CORVUS *Glandarius*.

PICA *Glandaria carulea cristata*, the *Blue Jay*. See CORVUS *Cristatus*.

PICA *Jamaicensis*. See GRACULA *Quiscalis*.

PICA *Maderaspatana*, &c. of Ray. See ORIOLUS *Melanocephalus*.

PICA *Marina*, *Puffin*. See ALCA *Arctica*.

PICA *Marina*. See HÆMATOPUS.

PICA *Papuenfis*. See TODUS *Paradisifacis*.

PICA *Papuenfis* of Brisson. See MUSCICAPA *Paradisifi*.

PICA *Persica*. See ORIOLUS *Persicus*.

PICA, in *Printing*. See PRINTING.

PICACIA, a name given by the ancients to that distempered appetite of women with child, and maidens at a certain time of life, which makes them long for things not fit for food. It is more usually called *pica*.

PICACUROBA, in *Ornithology*, the name of a Brazilian species of pigeon, of a greyish colour, variegated with a reddish-brown, and with very red legs and feet. See COLUMBA *Carolinensis*.

PICÆ, the second order of the class AVES in the Linnæan system. The distinguishing characteristics of this order of birds are; a bill somewhat compressed, more or less crooked, and always convex; toes divided, and adapted either for climbing or for stepping. Some of them feed on insects, worms, and the flesh and offal of other animals, and some on the seeds and juices of plants. During the breeding season they are monogamous, and make their nests in trees; and during the time that the female is sitting, he is fed by the male. There are twenty-six genera, divided into sections.

A. Feet formed for perching: this section contains

Buphaga,	Oriolus,
Certhia,	Paradisifa,
Coracias,	Sitta,
Corvus,	Trochilus,
Glaucoptis,	Upupa.
Gracula,	

B. Feet formed for climbing, containing

Bucco,	Pittacus,
Crotophaga,	Rhamphastos,
Cuculus,	Scythrops,
Galbula,	Trogon,
Picus,	Yunx.

C. Feet formed for walking, containing

Alcedo,	Momotus,
Buceros,	Todus.
Merops,	

PICANING, in *Geography*, a town of Africa, on the Ivory coast. N. lat. 5° 25'. W. long. 4° 35'.

PICARA, a large province of South America, in New Granada; bounded on the east by the Andes.

PICARD, in our *Old Writers*, a kind of large boat, about fifteen tons or upwards, used on the river Severn. Stat. 35 Hen. VIII. cap. 9. 13 Eliz. cap. 11.

PICARD, JOHN, in *Biography*, an able French astronomer and mathematician in the 17th century, was born at Flèche, in Anjou, but in what year is not known. He was educated for the church, but had a strong thirst for mathematical knowledge, and for those other branches of science that depend upon it, particularly for astronomy. Coming to Paris, his talents soon rendered him known and respected; and as the Academy of Sciences was at that time forming, he was selected to become one of its members, and was associated with them in the year 1666, with the appointment of astronomer to the academy. In the same year he published a new micrometer, for measuring the smallest apparent diameters of the stars, and their least sensible distances. In 1671 he was sent by order of the king to the observatory of Uraniberg, on the island of Huen, in the Sound, not far from Copenhagen, in order that by astronomical observations on the spot, he might determine, with the greatest exactness possible, the true elevation of the pole, and the longitude of that place, for the purpose of adapting to the meridian of Paris the astronomical tables on the observations of Tycho Brahe. He was commissioned likewise to collect, as far as possible, the original manuscripts of Tycho Brahe's observations which had been printed in Germany. He was successful in his researches, and the MSS. were found to differ in many respects from the printed copies, and they contained a book more than had been printed. He traversed several parts of the kingdom of France for the purpose of measuring the degrees of the French meridian, and he first gave a chart of the country, which the celebrated Cassini carried to a great degree of perfection. He was one of the first who applied the telescope to astronomical quadrants; and he was the projector of the work entitled "Connoissance des Temps," which he calculated from 1679 to 1683 inclusively. He died in the last named year: his chief works are as follow: "A Treatise on Levelling;" "Practical Dialling by Calculation;" "Fragments of Dioptrics;" "De Mensuris;" "De Mensura Liquidorum et Aridorum;" "An Abridgment of the Measure of the Earth;" "A Journey to Uraniberg, or Astronomical Observations made in Denmark." These and other of his pieces are to be found in the 7th and 8th vols. of the *Memoirs of the Academy of Sciences*. Moreri.

PICARDS, in *Ecclesiastical History*, a religious sect, which arose in Bohemia in the 15th century, so called from its author, who, because he originally came from Picardy, was called *Picard*. He drew after him, as it has been said,

a great number of men and women, pretending he would restore them to the primitive state of innocence in which Adam was created: and accordingly himself assumed the title of the New Adam.

Under this pretence (say their enemies) he taught his followers to abandon themselves to all impurity; making them believe, that in this consisted the liberty of the sons of God; and that all those not of their sect were in bondage.

He first began in Germany and the Low Countries, persuading many people to go naked, and giving them the name of Adamites. After this, seizing an island in the river Laufneez, a few leagues from Thabor, the head quarters of Zisca, he fixed himself and his followers therein; appointing his women to be common, but allowed none to enjoy them without his permission: so that when any man desired a woman, he carried her to Picard, who gave him leave in these words, "Go, increase, multiply, and fill the earth."

At length Zisca, the great general of the Hussites, (so famous for his victories over the emperor Sigismund), struck with their abomination, marched against them; and, making himself master of their island, put them all to death except two; whom he spared to inform himself of their doctrine.

Such is the erroneous and injurious account, as many have thought, which different writers, ultimately relying on the insufficient authorities of Æneas Sylvius and Varillas, have given of the Picards, who seem to have been a party of the Vaudois, or Waldenses, that fled from persecution in their own country, and sought refuge, about the beginning of the 15th century, in Bohemia. It is very doubtful whether a sect of this denomination, chargeable with the licentious principles and conduct above recited, ever existed; and we cannot forbear expressing our astonishment that Mr. Bayle, in his art. *Picards*, should adopt the reproachful representations of the writers just mentioned.

It is most probable, as competent and candid judges have maintained, that the whole or a great part of these charges is either an exaggeration or a calumny invented and propagated, in order to disgrace the Picards, because they deserted the communion and protested against the errors of the church of Rome. Lactantius relates, that Picard settled in Bohemia in the year 1418, accompanied by forty other persons, besides women and children. The Jesuit Balbinus, in his *Epitome Rerum Bohemicarum*, lib. ii. concurs in this account, and charges on the Picards none of the extravagancies or crimes ascribed to them by Sylvius. Schlecta, secretary of Ladislaus, king of Bohemia, in his letters to Erasmus, gives a particular account of the Picards; representing them as persons, who considered the pope, cardinals, and bishops of Rome, as the true Antichrists; who censured those that adored the consecrated elements in the eucharist as idolaters, and denied the corporal presence of Christ in this ordinance; who condemned the worship of saints, prayers for the dead, auricular confession, the penance imposed by priests, the fasts and vigils observed in the Romish church; and confined themselves to the observance of the sabbath, and of the two great feasts of Christmas and Pentecost. From this abstract of their sentiments, it sufficiently appears, that they were no other than the Vaudois; and M. de Beaufobre has plainly shewn that they were both of the same sect under different denominations. Besides, it is a certain fact, that the Vaudois were settled in Bohemia in the year 1178, where some of them adopted the rites of the Greek church, and others those of the Latin church. The

former were generally adhered to till about the middle of the fourteenth century, when the establishment of the Latin rites occasioned great disturbance. When the national troubles commenced in Bohemia, on occasion of the opposition to the papal power (see *MORAVIANS*), the Picards appeared more publicly in the avowal and defence of their religious opinions; and they formed a considerable body in an island by the river Launitz or Laufneez, in the district of Bechia, and recurring to arms, were defeated by Zisca. *Encyclop. art. Picards.*

Mosheim considers the Picards as deriving their name from that of the *Begbards* (see that article), by a change in the pronunciation of that word, and concurs in the unfavourable account of them given by the writers to whom we have already referred. He represents them as appearing in the religious assemblies, and joining in the celebration of divine worship, without any veil or covering whatever; agreeably to the maxim which they are said to have adopted, *viz.* that those were not free (*i. e.* sufficiently extricated from the shackles of the body) who made use of garments, particularly such garments as covered the thighs and the parts adjacent. But though he mentions this practice, and denominates them an absurd sect, which by such tenets incurred deserved reproach, he acknowledges that in their religious assemblies nothing passed that was contrary to the rules of virtue, however they were suspected of the most scandalous incontinence, and of the most lascivious practices. He states that Zisca, the austere general of the Hussites, gave credit to the rumours that were industriously circulated against them; and falling upon them in the year 1421, put some to the sword, and condemned the rest to the flames, which dreadful punishment they sustained with the most cheerful fortitude, and also with a contempt of death that was peculiar to their sect, and which they possessed in a degree that seems to surpass credibility. These extravagant enthusiasts, he says, were distinguished by other appellations, such as those of *Adamites* and *Begbards* (see these articles), and the denomination was extended so as to comprehend the Hussites, and all the Bohemians who opposed the tyranny of the church of Rome. They were called by their enemies, and indeed by the multitude in general, "Picardiers." He says that Beaufobre, in his attempts to justify the Picards, or Bohemian Adamites, against the accusations of their enemies, which he considers as altogether groundless, is manifestly endeavouring to wash the Ethiopian white: and he adds, that it may be demonstrated, by the most unexceptionable and authentic records, that his account is true; suggesting at the same time a charge of prejudice and partiality against the respectable and learned author from whom he differs. *Ecccl. Hist. vol. ii. p. 464, note.*

**PICARDY**, in *Geography*, a considerable province of France before the revolution, which now forms the departments of the Somme, part of the department of the Straits of Calais, and the department of the Aisne; which see respectively.

**PICARY**, in *Zoology*, a name given by Bancroft, in his "Guiana," to the *Sus Tujassu*; which see.

**PICATUM VINUM**. See **VINUM**.

**PICAUVILLE**, in *Geography*, a town of France, in the department of the Channel; 9 miles N.W. of Charantan.

**PICAWEEES**, Indians of America, on the banks of the Great Miami.

**PICCINI, NICOLA**, in *Biography*, born in 1728 at Bari, capital of the little province of that name, in the kingdom

## PICCINI.

kingdom of Naples, may be ranked among the most fertile, spirited, and original composers that the Neapolitan school has produced. An invincible passion for music frustrated the intention of his father, who designed him for the church, and made him study for that intent; but for fear of his neglecting serious business for amusement, he would not let him learn music. The young man, whose genius suffered him not to rest, never saw an instrument, especially a harpsichord, without emotion; he practised in secret all the opera airs which he had heard, and which he retained with surprising accuracy. His father having carried him one day to the bishop of Bari, he amused himself in the room where he was left alone, with a harpsichord which he found there, thinking he could be heard by no one; but the prelate in the next apartment having heard him, condescended to go to the harpsichord, and obliged him to repeat many of the airs which he had been playing; this he did with so much accuracy and precision, with the ritornelle and accompaniments, which he likewise remembered, that the bishop persuaded his father to send him to the Conservatorio of St. Onofrio, at Naples, of which the celebrated Leo was then the principal master.

The young Piccini was admitted in that seminary in 1742, and was placed at first under the tuition of a subaltern master, whose lessons, given in a dry and contracted manner, soon disgusted him: and in a few months his discontent at such unprofitable instructions drew on him the resentment of his tutor, expressed in no very gentle way. Shocked with this treatment, he resolved to study by himself, and began composing without rules, or any other guides than his own genius and fancy, psalms, oratorios, and opera airs; which soon excited the envy or admiration of all his fellow students. He even had the courage to compose an entire mass. One of the masters who had seen it, and even permitted him to have it rehearsed, thought it right to mention it to Leo; who, a few days after, sent for Piccini to come and speak to him. The young man, penetrated with the highest respect for so great a master, which is in some sort an intuitive indication of genius, was extremely frightened at this message, and obeyed the order with fear and trembling. "You have composed a mass," said Leo, with a cold, and almost severe countenance: "Yes, sir." "Shew me your score;"—"sir, sir,"—"shew it me, I say." Piccini thought himself ruined; but he must obey. He fetched his score, at which Leo looked, turned over the leaves, examined each movement, smiled, rung the bell, as the signal for a rehearsal. The young composer, more dead than alive, begged in vain to be spared what he thought such an *affront*. The singers and instrumental performers obeyed the summons; the parts were distributed, and the performers waited only for Leo to beat the time. When turning gravely to Piccini, he presented him the *baton*, which was then used every where in the performance of full pieces. Piccini, put to new confusion, offered fresh prayers to be excused obeying this command, wishing he had never dared to meddle with composition. At length he mustered his courage, and marked with a trembling hand the first bars. But soon animated and inflamed by the harmony, he neither saw Leo, nor the standers by, who were numerous; he was absorbed in his music, and directed its performance with a fire, energy, and accuracy which astonished the whole audience, and acquired him great applause. Leo kept a profound silence during the performance: when it was over,—"I forgive you, for once," said he, "but if you are again guilty of such presumption, you shall be punished in such a manner as you will remember as long as you live. What! you have received from nature so estimable a disposition for

study, and you lose all the advantages of so precious a gift! Instead of studying the principles of the art, you give way to all the wild vagaries of your imagination, and fancy you have produced a master-piece." The boy, piqued by these reproaches, related what had passed between him and the assistant master under whom he was placed. Leo became calm, and even embraced and caressed him; ordering him to come to his apartments every morning, to receive instructions from himself.

This truly great master died suddenly some months after. Happily for his promising pupil, his successor was the celebrated Durante, one of the most learned composers Italy ever produced. He soon distinguished Piccini from the rest of his class; conceived a particular affection for him; and had pleasure in communicating to him all the secrets of his art. "Others are my pupils," he sometimes used to say, "but this is my son."

At length, after twelve years' study, Piccini, in 1754, quitted the Conservatorio, knowing all that is permitted to an individual to know in practical music, and possessed of such a creative and ardent imagination, as perhaps, till then, was unexampled.

He began his career at the Florentine theatre in Naples, which is that of San Carlo, what Foote's theatre used to be compared with Drury Lane, or the Opera House. His first production there was "Le Donne Dispettose," and the next year, "Le Gelosie," and "Il Curioso del suo Proprio Danno," of all which the success increased in a duplicate ratio. At length, in 1756, he set the serious opera of "Zenobia" for the great theatre of San Carlo, which was crowned with still greater success than his comic operas. In 1758, he composed "Alessandro nell' Indie," for Rome; and after this, every theatre in Italy was eager to engage him. In 1760, his celebrated comic opera of the "Buona Figliuolo" had a success that no musical drama could boast before. It was no sooner heard at Rome than copies were multiplied, and there was no musical theatre in Europe where this burletta was not frequently performed, in some language or other, during many years. In 1761, he composed six operas, three serious and three comic, for different theatres of Italy; and was at once applauded in Turin, Reggio, Bologna, Venice, Rome, and Naples. Sacchini assured us, in 1776, that Piccini had composed at least three hundred operas, thirteen of which were produced in seven months. On his arrival at Paris, he received many mortifications before his reputation was firmly established, from the partizans of the old French music, as well as the friends of Gluck. The success of his operas of "Roland," "Atys," "Iphigénie en Tauride," "Adele de Ponthieu," "Didon," "Diane et Endymion," and "Penelope," seems to have solved a problem which was long thought insolvable: "Whether the French language was capable of receiving Italian melody?"

If we add to so many dramatic works the oratorios, masses, cantatas, and occasional songs and scenes in pasticcio operas, it would prove, that in twenty-five years he had produced more music, and good music, than any other ten masters had done in their whole lives.

What still more astonishes in such innumerable works, is the prodigious variety which reigns in them all; and the science which never degenerates into pedantry or affectation; an harmony pure, clear, and profound; a melody perfectly suited to the subject and situation of the performers; and a force, an originality, and resources of all kinds, unknown till his time, and of which perhaps the secret will long remain undiscovered. And what appears as extraordinary as the rest is, that the genius of this

master, far from being exhausted by so many labours, by frequent and severe sickness, by domestic disquietude and chagrin, inseparable from a numerous family, seemed, before the revolution, to continue in full force. Deprived of all his appointments, and well-earned theatrical pensions, he returned to Naples, where, after he had established himself in France, all his appointments had been disposed of. Unluckily, on the arrival of a French army at Naples, he either did adhere to the invaders, or was supposed by the court to be in correspondence with them, which occasioned his disgrace, and precipitated his flight back to Paris, where he was received with open arms, and placed at the head of a new singing school; but we have heard nothing of new compositions after his return, nor any thing more concerning him, except that he died at Paris in 1800.

**PICCININI, ALESSANDRO**, of Bologna, lived about the year 1570, and was in the service of the duke of Ferrara in 1594. He is author of a treatise on the tablature of the lute, which was in great estimation. In this work, we find the origin of the *theorbo* and *pandore*. He pretends to have been the inventor of the *arch-lute*.

**PICCIOLO**, in *Commerce*, a money of account in the island of Sicily. Thus, a taro contains 2 carlini, 15 ponti, or 120 piccioli; a carlino, 10 grani; a pon.o, 8 piccioli; and a grano, 6 piccioli.

**PICCITONO, PARDE ANGELO DA**, in *Biography*, author of a book entitled "Fior Angelico di Musica," published at Venice in 1547; a work which, however difficult to find at present, is, from its dulness and pedantry, still more difficult to read.

**PICCOLOMINI, ALESSANDRO**, a learned Italian, was born at Sienna in 1508. He passed the early part of his life in his native place, and was a member of the celebrated academy of *Degli Intronati*, in which he bore the name of "Stordito." He is supposed to have been in that city at the time of the visit of the emperor Charles V. in 1536, when his comedy, entitled "Amor Costante," was recited before that prince. He wrote two other comedies, "L'Alessandro" and "L'Ortenzio," and translated the 13th book of Ovid's *Metamorphosis*, and the 6th book of Virgil's *Eneid*, into Italian verse, and printed a collection of 100 sonnets. About the year 1540 he went to Padua, where he was aggregated to the academy *Degli Infiammati*, and engaged to read lectures in it on moral philosophy. He wrote books also on morals, on philosophy, and astronomy; and by order of duke Francesco de Medici, he wrote a book on the reformation of the calendar undertaken by pope Gregory XIII. He resided several years at Padua and Rome, and at an advanced age retired to Sienna, where he possessed a villa and a fine garden. In 1574 Gregory nominated him to the titular archbishopric of Patras, and made him coadjutor of the archbishop of Sienna. He died in 1578, and was interred in the cathedral of that city.

**PICE**, in *Commerce*, a money of account and copper coin in the East Indies. At Calcutta and in Bengal, 12 pice = 1 anna, and 16 annas = 1 current rupee. See **RUPEE**.

The double and single pice are copper coins, with a mixture of tin or lead at Bombay, the single pice being  $\frac{1}{4}$  reas, and the double pice or fuddra being 8 reas, the rea being  $\frac{1}{16}$  of the quarter, and the quarter  $\frac{1}{4}$ th of the rupee. At Anjengo, on the Malabar coast, accounts are kept in fanams, pice, and budgerooks: a fanam being = 12 pice, or 16 vis, and 1 pice = 4 budgerooks: a silver rupee is worth 7 old fanams, or 6 new ones, called galloa fanams. All these are real coins. At Scindy the coins are silver rupees of 16 annas or 48 copper pice. At Surat, accounts are kept in rupees of 16 annas or 64 pice. Here are also

pezas or pice of copper or lead, 64 of which are reckoned to 1 silver rupee. Sixty padens, a sort of bitter almonds from Persia, pass for 1 pice.

**PICE** is also a weight in the East Indies. See **MAUND**.

**PICENDACA**, in *Ancient Geography*, a town of India, in the interior of the country belonging to the people called Arvari. Ptolemy.

**PICENTES**, a people of Italy, inhabitants of Picenum, who were originally Sabines. Strabo says that they took their name from the word *picus*, which they followed whilst they were going to establish themselves in their new country. See **PICENUM**.

**PICENTIA, BICENZA**, a town of Italy, and capital of the Picentini. It was situated in the interior of the country: and Pliny reports, that the inhabitants were driven from it on account of their having taken part with Hannibal. It continues to subsist under the same name; though at present there are merely traces of it remaining.

**PICENTINI**, a people of Italy, who were descended from the Picentes, and whose immediate origin is very uncertain; they were settled towards the west on the sea-coast.

**PICENTINUM, PEZENTINUM, or Pefcentinum**, a town of Pannonia, upon the route from Æmona to Sirmium, between Inicerum and Leuconum, according to Antonine's Itinerary.

**PICENUM**, a country of Italy, on the Adriatic gulf; extending from the Æfis, towards the N.W., as far as Truentus. It was bounded to the N. by the Æfis, to the S. by the Truentus, to the E. by the Adriatic sea, to the W. by a small part of Umbria and mount Fiscelus, and some other mountains which separated it from the country of the Sabines. Its principal rivers were the Æfis, the Mifios, the Potentia, the Tinna, and the Truentus. The most noted places were, commencing from the N., Ancona, Auximum, Firmum, and Asculum. The origin of its name has been given under Picentes. Eusebius and Servius, however, give the name of Picus to the chief of the colony.

**PICHANA**, in *Geography*, a town of South America, in the province of Cordova; 130 miles N.W. of Cordova.

**PICHINCA**, a mountain of Peru, in the jurisdiction of Piura, and bishopric of Truxillo, whose height is said to be 2432 toises above the level of the sea. M. Von Humboldt was twice at the mouth of the crater of this mountain; no one but Condamine having ever reached it before. From the edge of the crater, he saw, rise three peaks, which are free from snow, as it is continually melted by the ascending vapour. At the summit of these is a rock that projects over the precipice, and from which he made his observations. The rock is about twelve feet long by six broad, and strongly agitated by frequent shocks, of which he counted eighteen in less than half an hour. On this he lay on his belly, that he might the better examine the bottom of the crater. The mouth of the volcano forms a circular hole, near a league in circumference, the perpendicular edges of which are covered with snow on the top. The inside is of a deep black; but the abyss is so vast, that the summits of several mountains may be distinguished in it. Their tops seemed to be six hundred yards below his station; and he has no doubt but the bottom of the crater is on a level with the city of Quito, which the mountain overlooks. Condamine found it extinct, and even covered with snow: but M. Humboldt found it burning. On his second visit, being furnished with instruments, he found the diameter of the crater to be 1600 yards, whereas that of

Vefuvius is but 670. The height of the mountain is 5280 yards.

PICHINCHAS, a town of South America, in the province of Quito; 15 miles N.E. of Quito.

PICHMANSKOL, a town of Russia, in the government of Olonetz, on the lake Latcha; 32 miles S.S.W. of Kargapol.

PICICITLI, in *Ornithology*, the name of a bird in the Spanish West Indies, described by Nieremberg. Its head and neck are black, and its whole body grey; it is a small bird, and makes its appearance in Mexico after the rainy seasons; it is a bird of passage, and it is not known where it breeds. See *PIPPA Criflata*.

PICIERNO, in *Geography*, a town of Naples, in the province of Basilicata; eight miles W.N.W. of Potenza.

PICIOTTI, a river of Naples, which runs into the sea, 15 miles S.E. of Reggio.

PICK, a river of Upper Canada, which runs into lake Superior, N. lat.  $48^{\circ} 28'$ . W. long.  $86^{\circ} 4'$ .—Also, a small island, in the N. part of lake Superior. N. lat.  $48^{\circ} 31'$ . W. long.  $86^{\circ} 28'$ .

PICK, among *Miners*, is a tool which they use to cut down the cliffs and rocks of stone to make passages in the earth; and which is also used in digging canals.

PICK-Axe, in the *Military Art*, a tool carried by the pioneers to dig up ground that is too hard for the spade; they are of great use for mending the ways, and in fortifications.

PICKS, *Ear*. See *EAR-picks*.

PICKAGE, or PICCAGE, *Piccagium*, an ancient custom, or duty, paid at fairs and markets, for breaking the ground, and pitching up stalls, or standings.

This profit of pickage was usually given, or granted, in charters for holding a fair or market.

PICKAWAY, in *Geography*, a county in the state of Ohio, containing, in 1810, 10 towns and 7124 inhabitants.—Also, a town in the said county, of the same name, containing 1598 inhabitants.

PICKEERING, or PICKEROONING. See *PICQUEERING*.

PICKER, or HORSE-PICKER, in the *Manege*, an iron instrument five or six inches long, bent or crooked on one side, and flat and pointed on the other. It is used by grooms to cleanse the inside of the horses feet, and to pick out the earth, sand, or small stones that get into them.

PICKERELL, in *Ichthyology*, an English name used by some authors for the jack or pike.

PICKERING, in *Geography*, a market-town in the west division of the wapentake of Pickering-Lythe, and North Riding of Yorkshire, England, is pleasantly seated on an eminence, surrounded by the lofty mountains of Blakemore, at the distance of 26 miles from York, and 225 from London. It is a town of very remote antiquity. It seems formerly to have enjoyed the privileges of a borough, and undoubtedly sent members more than once to parliament. How it lost this right is unknown; but it was most probably through neglect. The market day here is on Monday weekly; and there are besides four annual fairs for horned cattle, horses, and sheep. Pickering is an honour belonging to the duchy of Lancaster, and possesses a jurisdiction over several of the neighbouring villages, lying within its boundaries. Here are, therefore, held the courts of the honour, and also the petty sessions for the west division of the wapentake.

In the parliamentary returns of 1811, the houses in this town are estimated at 540 in number, and the inhabitants at 2332. The former are arranged chiefly in one long straggling

street, which offers no edifice worthy of notice, except the church, an ancient and spacious structure, adorned with a lofty spire. Here are three meeting-houses appropriated to the public worship of Quakers, Presbyterians, and Methodists. Its western extremity, however, is rendered interesting by the remains of a strong castle, which occupies the brow of a hill overlooking the town, and commanding a delightful view of the vale of Pickering. The date of the foundation of this fortress is uncertain, but it appears from Domesday book to have belonged to Morcar, earl of Northumberland, in the time of Edward the Confessor. In the beginning of the reign of Henry III. the custody of it was committed to William, lord Dacre, high sheriff of the county; but this nobleman had only retained it two or three years, when it was bestowed by the monarch on his own son, Edmund, earl of Lancaster, whose successor, Thomas, forfeited it to the crown by rebellion. His descendants, however, afterwards recovered it; and it consequently came by marriage into the possession of the celebrated John of Gaunt, duke of Lancaster and king of Castile. What became of it after his death is unknown; but in the reign of queen Elizabeth we find it once more possessed by the crown; and in the time of the civil wars, in the seventeenth century, it is recorded to have stood a long siege against a party of the parliamentary forces sent to reduce it. *Beauties of England and Wales*, vol. xvi., by John Bigland.

PICKERING, a township in the East Riding of the county of York, in Upper Canada, between Whitby and Scarborough, and parting lake Ontario.

PICKERSGILL COVE, a harbour within Christmas Sound, on the S. coast of Terra del Fuego, at the S. extremity of South America.

PICKERSGILL Harbour, a port of New Zealand, on the S. shore of Dusky bay. S. lat.  $45^{\circ} 47'$ . E. long.  $166^{\circ} 18'$ .

PICKERSGILL Island, a small island in the South Atlantic sea, near the S. coast of the island of Georgia, so called after the name of captain Cook's third lieutenant. S. lat.  $54^{\circ} 47'$ . W. long.  $36^{\circ} 42'$ .

PICKERSVILLE, the chief town of Washington district, in South Carolina; 771 miles from Philadelphia.

PICKET, PICQUET, or *Piquet*, in *Fortification*, a stake sharp at one end, and usually shod with iron; used in laying out the ground, to mark the several measures and angles thereof.

There are also larger pickets, driven into the earth to hold together fascines, or faggots, in any work cast up in haste.

PICKETS are also stakes driven into the ground by the tents of the horse, in camp, to tie their horses to; and before the tents of the foot, where they rest their muskets, or pikes about them, in a ring.

The picket was a corporal punishment, chiefly used by the cavalry and artillery, and in the former often inflicted by order of the commanding officer, without the sentence of a court-martial. The mode of inflicting it was this: a long post being driven into the ground, the delinquent was ordered to mount a stool near it, when his right hand was fastened to a hook in the post by a noose round his wrist, drawn up as high as it could be stretched; a stump, of the height of the stool, with its end cut to a round and blunt point, was then driven into the ground near the post before-mentioned, and the stool being taken away, the bare heel of the sufferer was made to rest upon the stump, which, though it did not break the skin, put him to great torture: the only mitigation he could obtain was by resting his weight on his wrist, the pain of which soon became intolerable. Soldiers were frequently sentenced to stand on the picket

for a quarter of an hour. This, like the riding of the wooden horse, has been for some time left off, as it lamed and ruptured many soldiers. See *WOODEN HORSE*.

**PICKETS** are also stakes with notches toward the top, to which are fastened the cordages of tents. Thus, to plant the picket, is to encamp.

**PICKET**, in *Gaming*. See **PICQUET**.

**PICKET**, *Watching*, in *Ornithology*. See **ORIOLOUS NIDIPENDULUS**.

**PICKLE**, a brine, or liquor, ordinarily composed of salt, vinegar, &c. sometimes with the addition of spices; in which meats, fruits, and other things, are preserved and seasoned.

**PICKLE** is also used substantively, for a fruit, root, leaf, or other vegetable matter, prepared in pickle, to be used by way of sauce, &c. See **SALLET**, &c.

They pickle artichokes, mushrooms, ashen-keys, barberies, asparagus, beans, onions, &c. Broom-buds, capers, and olives, are pickled with oil and vinegar.

**PICKLE**, in *Agriculture*, a sort of brine or liquor used for steeping grain, to preserve it from disease, slugs, and vermin.

A great number of different compositions have been at different times employed as steeps or pickles, for freeing grain from disease; but those which are the most in use at present are such as are described below, though very strong solutions of common salt, and other similar substances, have been often employed.

*Pickle Arsenic*.—Much advantage is said to have been found by Mr. Young, from the use of half a hoghead of strong lixivium of wood-ashes, put in a cast-iron boiler, with seven pounds of common salt, and one pound of arsenic boiled well, and kept in the boiler for use when cold. And which, without the salt, was employed with benefit by Mr. Andrews.

*Pickle Salt*.—This is prepared, according to Mr. Summerville, sometimes with plain water, into which common kitchen salt is put, till it is of such a strength as to float an egg. In many cases, however, sea-water is used, and salt added to it, till it will also carry an egg. The advantage of using sea-water is, that less salt is required. The pickle, thus prepared, is put into a large open vessel, that will hold perhaps 30 or 40 gallons: the wheat is then poured into it, in the quantity of from a bushel, to two bushels at a time, and well stirred round, either with a broom or a stick; during the stirring, the light grains rise to the surface and are skimmed off; the vessel is then lifted up, and the contents poured into another of equal dimensions, upon the mouth of which a sieve is placed; the sieve retains the grain, and suffers the pickle to pass through it into the vessel beneath. The same quantity of wheat is again put into the pickle, and the same process repeated, till the whole has been washed and pickled; and progressively as it is taken out of the water, some new slaked lime is lifted upon it. The whole is then carefully mixed up with a wooden shovel, and frequently turned over, till it attain a sufficient degree of dryness, in which state it is committed to the earth without any further preparation or management.

*Pickle Urine*.—This is prepared in this way, according to the same writer: a quantity of urine, in as stale a state as possible, is put into a vessel, in the same manner as for the salt pickle, into which the grain is put and well stirred. The contents are then poured through a sieve, and the process continued till the whole of the wheat intended to be sown is moistened. It is then sprinkled with lime, as in the former case, and committed to the earth. It is, however, added, that in many cases, instead of mixing the whole of

the grain with the urine, it is common to spread the wheat upon the barn-floor, and sprinkle the urine upon it, either with a watering-pan or a kind of brush made of straw: when it is sufficiently moistened, lime is made use of as before, and the grain sown.

*Pickle Italian*.—This is that recommended by J. B. Scandella, an Italian physician, which is prepared in this manner: Take of nitre, three pounds; alum, one pound; vitriol, six ounces; verdigris, three ounces; wood-ashes, well sifted, six pounds; boil the whole in a copper with five pails of water for an hour, then remove them from the fire, and pour them into a large vessel; then add sixteen pails of water, in which half a bushel of quick-lime has been previously dissolved; mix the whole intimately, and allow them to stand still till they are quite cold. In this steep, two bushels and a half of wheat are to be plunged, and left for about six hours, stirring it up frequently with a wooden shovel, and skimming off what rises to the surface: the wheat is then to be withdrawn, and spread out till it is dry enough for sowing. The process is thus to be continued until the whole quantity of seed intended to be sown is pickled. The above steep is generally sufficient for preparing about twenty-four bushels of wheat.

And on these different pickles or steeps the ingenious writer has made several pertinent reflections. On the first he remarks, that as far as his own observation, aided by the testimony of the most respectable farmers, can be depended upon, it has never been known to fail in a single instance, where judiciously applied; that is to say, it has always prevented the crop from suffering by smut. But though it has answered this purpose most effectually, and the proofs in favour of it are too numerous to be disputed, there is little doubt that, under certain circumstances, it may be highly injurious to the crop. And that while the grain, steeped in this pickle, continues in a moist state, it may be kept for any length of time, without much injury to its vegetative powers; a circumstance of no small consequence, as it not unfrequently happens that after the grain has been pickled, and made ready for sowing, a sudden fall of rain prevents it from being put into the earth for several days, perhaps weeks. But though the pickle is thus harmless while the grain continues in a moist state, repeated trials convince him that it is quite otherwise when well dried, and exposed to a certain degree of heat. He does not hazard this merely as an opinion, but speaks from conviction, when he says that if wheat, which has undergone this preparation, and has had lime in a very active state mixed with it, is sown early in the autumn (as in August), upon dry warm land, and no rain falls for a considerable time after, a thing by no means uncommon at that season of the year, a great proportion of the grain will either be entirely destroyed, or materially injured, by the dry caustic crust with which it is surrounded. The mischief in this case is certainly done by the action of the lime, and in many instances is, he supposes, very considerable. But in order to avoid this inconvenience, the writer states, that from much inquiry, as well as numerous trials of his own, he is perfectly satisfied that the most valuable part of this preparation consists in immersing the wheat in the brine, and that the lime is only added afterwards as an absorbent to dry up the superfluous part of the moisture, and make the grains separate, and sow more readily. If this is admitted, and it certainly is the case, it will be extremely easy to reap the whole benefit of the salt pickle, without any of its defects, merely by substituting some other article in the place of lime; and for that purpose nothing seems better calculated than powdered chalk, or common whitening. The former is known, in its unburnt state,

state, to be entirely destitute of any caustic or corrosive quality; and the latter consists of burnt limestone, which has been completely saturated with moisture, and afterwards dried, by which process its activity is destroyed. Both of these articles can be obtained in sufficient quantity, in most situations; and as neither of them are expensive, they will be found good substitutes for lime; and if properly managed, will answer every purpose that can be expected from it, without the smallest degree of risk.

It is asserted, in respect to the urine pickle, that there is no article at present employed that requires to be used with more circumspection than this; nor is there any where the risk or loss attending its use has a chance of being so great. He is ready to admit, that where the urine is sufficiently stale, and the grain properly moistened with it, every insect or animalcule contained therein will be completely destroyed; but to counterbalance this, he has to state that as yet there has been no test established to ascertain the necessary degree of staleness: and as it is known that urine, which is not stale, will not destroy vermin, there is an absolute certainty, if it is used in that state, it will be of no service; and that, on the other hand, when urine is completely stale, it abounds with volatile alkali, which, in its naked state, is known to be hurtful, when applied either to seeds or plants; but when united with lime, it then forms what is called caustic alkali, in which state its strength and dangerous qualities are very considerably increased. This compound, though an excellent manure when applied to the soil, and allowed to operate properly upon it before the crop is sown, is completely destructive both to seeds and plants, when brought into contact with them. When wheat, therefore, has been completely moistened with urine, and is afterwards mixed with quick-lime, the crust with which it is surrounded will be of the most acrid nature, and nothing but throwing the seed immediately into a tolerably moist soil can possibly save it from destruction. Accordingly it has often happened, when wheat pickled in this way has, by bad weather, or any other accident, been prevented from being sown even for a single night, nine-tenths of the seed have been known to perish. He has said, that nothing can save the seed thus crusted over from destruction, but sowing it instantly upon land containing a certain share of moisture. If the soil happens, however, to be of a warm nature, is very dry at the time of sowing, and the weather continue warm and dry for any considerable time afterwards, an immense deal of the seed will perish by the action of the pickle. And these objections to the urine pickle, which every man who is in the slightest degree acquainted with its chemical properties will readily understand, apply to those cases where the pickle has been most faithfully prepared and administered, and that is when the grain has been completely immersed in it. The other method, *viz.* that of laying the wheat upon the barn-floor, and sprinkling it with a wisp of straw dipped in the urine, is also liable to many objections. He has already hinted, that we have at present no test for ascertaining the necessary degree of staleness in urine: the want of this must always subject the use of it to very great uncertainty. But admitting that it were in all cases sufficiently stale, there is no possibility of applying it properly or equally, when the wheat is spread upon the floor: some of it will have more moisture than it requires, some will be very imperfectly moistened, and many of the grains will not be moistened at all. He need scarcely add what the consequences of such management will be. The part of the seed, which has got an over-dose, will be subjected to all the risks he has mentioned, from the caustic quality of the urine and lime; and the remaining part, which has been either imperfectly

moistened, or not moistened at all, will, by the vermin not being destroyed, produce blighted or smutted ears. When speaking of the salt pickle, he has said, that if powdered chalk or common whitening are used, it will destroy the insects as effectually as lime, and that without the least risk to the grain, and has accordingly recommended it to be prepared in that way. The urine pickle he decidedly condemns, as it is in every point of view liable to insuperable objections: for whether the urine is used singly, or in conjunction with lime, great mischief may be done by it, if the wheat is either prevented by any accident from being sown even for a single night, or if it is sown upon dry land, and the weather continues warm, and no rain falls for a considerable time afterwards; but if the urine pickle is ever had recourse to, it will certainly be much milder, if chalk or whitening be employed as absorbents in place of lime, than under other circumstances.

But he is fully sensible that much opposition will be made to the doctrine here laid down concerning these pickles, especially by those who have been long accustomed to the use of them; and who, without knowing the risk with which they are attended, have generally ascribed the failure or deficiency of their wheat crop to other causes. But the ideas here held forth are by no means the offspring of conjecture, or a warm imagination. Careful trials have been made of each, under almost every variety of circumstances that can occur, with this result;—that though, in a few fortunate cases, both the salt and the urine pickles may be used without any seeming loss or inconvenience, yet in a majority of all the instances in which they are employed, more or less of the seed perishes from their effects. He has, for several years past, made trials of both pickles upon a given number of seeds, sown at different periods of the season, and under different circumstances of heat and moisture, and he has uniformly found that when wheat, pickled with salt and lime, was sown either upon ground containing a moderate share of moisture, or had a slight shower soon after it was sown, scarcely one grain in ten perished; whereas, when it was sown upon warm dry land, and no rain fell for perhaps two or three weeks afterward, nearly a third of the seed never vegetated. And that when the urine pickle was used, even under the most fortunate circumstances, two grains out of ten, or one-fifth part of the whole, was generally the least failure that happened, even when it was sown immediately after being pickled: but in cases when it was kept a night or two in the pickle, nine-tenths of the seed have been known to perish; and when sown upon very dry land, and much dry warm weather followed, the loss has also been very great. These trials having been made with a given number of grains, the writer was enabled to ascertain, with perfect accuracy, the proportion which perished in each experiment.

But with regard to the last sort, or Italian pickle, it has not hitherto been sufficiently in use fully to ascertain in what respects it may be injurious, or beneficial, when made use of in preparing seed corn for being put into the ground. From the nature of the different ingredients, it would, however, seem to be a preparation of an active nature, and which should be employed with caution, till more full experience has shewn its effects and advantages.

PICKLE is also a term sometimes applied to the grains of wheat, in discriminating its quality; thus we have a *lean* and a *hungry* pickle, &c.

PICKLED FISH. See FISH.

PICKLING of Grain, in *Agriculture*, the art of steeping it in pickles, in order to preserve it, and prevent the crops from being diseased.

It is sufficiently plain, from what has been observed in respect to pickles, that they are liquors of a very active nature, and which must be employed with considerable care, and nice attention to the circumstances of the weather and state of the land; as, without this, much injury and disadvantage, instead of benefit, may be the result. The length of time for effecting the purpose, in the safest manner, must also be had in the mind of the farmer; as the steeping of grain from twenty to twenty-four hours in solutions of wood-ashes and arsenic, as well as in lime-water, gave clean crops from extremely smutty seed; while the retaining it in these mixtures only a short time had but a comparatively trifling effect. In all cases, in using these pickles, great attention should likewise be paid to having the grain as equally as possible imbibed and impregnated with the liquors, as in this way the most beneficial effects must be produced.

But whatever danger there may be in pickling seed corn, for the purpose of preventing its being affected with the smut, it is a practice that is seldom or ever neglected in the northern parts of England, and in Scotland, without the farmers in these parts suffering from such omissions.

PICKOUAGAMIS, in *Geography*, a river of Canada, which runs from lake Shabamoushan to lake St. John.

PICLE, PICTELLUM, a small parcel of land inclosed with a hedge; a little close. This word seems to come from the Italian *picciola*, i. e. *parvus*; and in some parts of England is called *pigtel*.

PICO, GIOVANNI, of Mirandola, in *Biography*, one of the most extraordinary persons of his time, surnamed the Phœnix, was the third son of Gianfrancesco Pico, prince of Mirandola, and Concordia. He was born in 1463, and almost from his childhood displayed an eager attachment to literature. At the age of 14 he was sent to Bologna to study canon law, but after spending two years there, he set out to visit the most celebrated schools in Italy and France. He went to Ferrara, where he was kindly received by his relation duke Hercules I., and studied under Batista Guarino. He had a great readiness in acquiring languages, and is said to have thoroughly understood twenty-two by the time he was eighteen years of age. This is probably an exaggeration. After he had employed seven years in his academical tour, he returned to Rome at the age of twenty-three. There he posted up 900 propositions appertaining to dialectics, morals, physics, mathematics, &c. offering to dispute with any antagonist whomsoever upon any one of them. This caused him to be looked upon with envy and jealousy, none daring to accept of his challenge. Thirteen of his propositions were however accused before the pope as contrary to sound doctrine. He published an elaborate defence of them addressed to Lorenzo de Medici, and after putting him to a considerable deal of trouble in justifying himself, he was acquitted of all blame. The effect of the anxiety produced by this business caused a total change in his course of life, and though young, rich, elegant in person and manners, and in some degree habituated to pleasure, he gave himself up to devotion, and confined his future studies to theological subjects. He fixed his abode in Florence, where he enjoyed the intimacy of several illustrious characters, among whom was Lorenzo de Medici, who testified his affection for him by calling him to a parting embrace on his death-bed. His high reputation caused him to be thought of for the cardinalate, but it does not appear that any steps were taken to advance him to that dignity. At this period he had a most enthusiastic desire to be useful, and he resolved to distribute all his property among the poor, and travel bare-footed through the world to preach the gospel. An early death, at the age of 32, put an end to his

projects. The writings of Pico display an acute genius, and a vast extent of learning, but they added very little to true science. His principal works are "Hexaplus, or an Explanation of the Six Days of Creation;" "Adversus Astrologiam Divinatricem;" *Epistolarum*, lib. viii.

PICO, GIANFRANCESCO, prince of Mirandola, nephew of the preceding, being son of his brother Galeotto, was born in 1470. He studied at Ferrara, and manifested, like his uncle, an early attachment to literature. After the death of his father, he succeeded to the sovereignty of Mirandola, an elevation which proved the source of many troubles. His brother Lodovico, who had married a daughter of general Trivulzi, was his competitor, and by the assistance of a third brother, he expelled Gianfrancesco in 1502. He was restored by the arms of pope Julius II. in 1511, but was again dethroned, and on the 15th of October, 1533, Galeotto, nephew of Lodovico, with a band of armed men surprised Mirandola, and entering the chamber of Gianfrancesco, put him and one of his sons to death, and then imprisoned his wife and younger son. He was probably much better fitted for a private than a public station. In the midst of all the changes of fortune, religion and letters were his chief solace. He was in habits of correspondence with all the eminent literary characters of his time, many of whom held him in the highest estimation. He was author of many works, but that by which he is best known is a life of his uncle, containing much curious information respecting that extraordinary man. He also composed a life and apology of the famous Savonarola.

PICO, or the PEAK, in *Geography*, one of the Azores, which derives its name from a high mountain, terminating in a peak. This volcanic mountain is by some reported to be equal to the peak of Teneriffe in height. Mr. Adanson, who visited these islands in his return from Senegal in 1753, says that the peak is about half a league in perpendicular altitude, which, allowing the French league to be 2450 toises, would give a moderate height, not exceeding 7350 feet. The peak would form a very convenient first meridian, from which to reckon the longitude. The dimensions of the island are about 30 British miles in length, and 10 in breadth. The chief places are Pico, Lagoas, Santa Cruz, San Sebastian, Pasquin, San Rocko, Playa, and Magdalena. The island is productive; its cattle are numerous, of various kinds, and excellent; its wine is highly commended; and it furnishes a considerable quantity and variety of wood, particularly the cedar and teixo, which is solid and hard as iron, and veined when finely polished. The inhabitants live wholly on the produce of their own island in plenty and comfort. Pico carries on a considerable trade in wine, which seems to be sold as Canary. N. lat. 38° 30'. W. long. 28° 16'.

Pico, a mountain of Spain, on the confines of New and Old Castile, and Estremadura.

Pico, or *Puerto de Pico*, a town of Spain, in Old Castile, on a mountain, near the source of the Tormes.

Pico *Sacro*, a mountain of Spain, in Galicia; nine miles S. of Santiago.

Pico *Teneriffe*, a mountain of Barbadoes; one mile S. of Cuckold's point.

Pico *el Teja*, a town of Spain, in Old Castile; 20 miles W.S.W. of Segorbe.

Pico *d'Urbino*, a mountain of Spain, in Old Castile; 12 miles S. of Calzada.

PICOLATA, a fortress of East Florida, on the river St. John; 27 miles from St. Augustine.

PICOLET POINT, a point on the N. side of the island of St. Domingo, that forms the W. boundary of the bay which

which sets up to cape Francois. Under its cannon ships have been secured in time of war.

PICOLO, a town of Italy, in Friuli; six miles S. of Udina.

PICOLOS, the name of an ancient Prussian idol, to which human sacrifice was offered. See POTRIMPOS.

PICOSA, or PISANA, in *Geography*, mountains of the coast of Peru, extending about seven leagues between Colamahe river and Salango island, S. of the equator, and serving for the direction of mariners.

PICOTA, a name given by some authors to a distemper which they describe as consisting wholly in an eruption of a number of very minute pimples upon the skin, all over the body; it is attended with no danger, unless they are struck in.

PICOY, in *Geography*, a town of Peru, in the diocese of Guamanga, on a river of the same name, which runs into the Xauxa, 20 miles N. of Guanca Velica.

PICQUEERING, PICKERING, or *Pickerooning*, a little flying war or skirmish, which the soldiers make when detached from their bodies to pillage, or before a main battle begins.

PICQUET, or PICKET, a celebrated game at cards, much in use throughout the polite world.

It is played between two persons, with only thirty-two cards; all the dices, threes, fours, fives, and sixes, being set aside.

In reckoning, at this game, every card goes for the number it bears, as a ten for ten; only all court-cards go for ten, and the ace for eleven: and the usual game is one hundred up. In playing, the ace wins the king, the king the queen, and so down. Twelve cards are dealt around, usually by two and two; which done, those that remain are laid in the middle. If one of the gamesters finds he has not a court card in his hand, he is to declare he has *carte blanche*, and tell how many cards he will lay out, and desire the other to discard, that he may shew his game, and satisfy his antagonist, that the *carte blanche* is real; for which he reckons ten.

Each person *discards*, *i. e.* lays aside a certain number of his cards, and takes in a like number from the stock. The first, of the eight cards, may take three, four, or five; the dealer all the remainder, if he pleases.

After discarding, the eldest hand examines what suit he has most cards of; and, reckoning how many points he has in that suit, if the other have not so many in that, or any other suit, he tells one for every ten of that suit. He who thus reckons most is said to win the *point*.

The point being over, each examines what *sequences* he has of the same suit; *viz.* how many tierces, or sequences of three; quarts, or fours; quintes, or fives; fixiemes, or sixes, &c. For a tierce they reckon three points, for a quarte four, for a quinte fifteen, and for a fixieme sixteen, &c. And the several sequences are distinguished in dignity by the cards they begin from: thus, ace, king, and queen, are called *tierce major*; king, queen, and knave, *tierce to a king*; knave, ten, and nine, *tierce to a knave*, &c. and the best tierce, quarte, or quinte, *i. e.* that which takes its descent from the best card, prevails; so as to make all the others in that hand good, and destroy all those in the other hand. In like manner, a quarte in one hand sets aside a tierce in the other.

The sequences over, they proceed to examine how many aces, kings, queens, knaves, and tens, each holds; reckoning for every three, of any sort, three; but here too, as in sequences, he that with the same number of threes has one that is higher than any the other has, *e. gr.* three aces,

has all his other made good hereby, and his adversary's are all set aside. But four of any sort, which is called a *quatorze*, always set aside three.

All the game in hand being thus reckoned, the eldest proceeds to play, reckoning one for every card he plays above a nine, and the other follows him in the suit: and the highest card of the suit wins the trick. Note, unless a trick be won with a card above a nine (except the last trick), nothing is reckoned for it: though the trick serves afterwards toward winning the cards; and that he who plays last does not reckon for his cards, unless he win the trick.

The cards being played out, he that has most tricks reckons ten for *winning the cards*. If they have tricks alike, neither reckons any thing. The deal being finished, and each having marked up his game, they proceed to deal again as before; cutting afresh each time for the deal.

If both parties be within a few points of being up, the *carte blanche* is the first thing that reckons; then the point, then the sequences, then the quatorzes or threes, then the tenth cards.

He that can reckon thirty in hand by *carte blanche*, points, quintes, &c. without playing, before the other has reckoned any thing, reckons ninety for them; and this is called a *re-pique*. If he reckons above thirty, he reckons so many above ninety. If he can make up thirty, part in hand, and part in play, before the other has told any thing, he reckons for them sixty. And this is called a *pique*. Whence the name of the game.

He that wins all the tricks instead of ten, which is his right, for winning the cards, reckons forty; and this is called a *capot*.

This game has, in some cases, been the object of mathematical computation.

Thus M. de Moivre has proposed and solved the following problems:

1. To find at picquet the probability which the dealer has for taking one ace or more in three cards, he having none in his hand. He concludes from his computation, that it is 29 to 28 that the dealer takes one ace or more.

2. To find at picquet the probability which the eldest has of taking an ace or more in five cards, he having no ace in his hand. Answer; 232 to 91, or 5 to 2, nearly.

3. To find at picquet the probability which the eldest hand has of taking an ace and a king in five cards, he having none in his hand. Answer; the odds against the eldest hand taking an ace and a king are 331 to 315, or 21 to 20 nearly.

4. To find at picquet the probability of having twelve cards dealt to, without king, queen, or knave; which case is commonly called *cartes blanches*. Answer; the odds against *cartes blanches* are 1791 to 1 nearly.

5. To find how many different sets, essentially different from one another, one may have at picquet before taking in. Answer; 23,967,278. This number falls short of the sum of all the distinct combinations, whereby twelve cards may be taken out of 32, this number being 225,792,840; but it ought to be considered, that in that number several sets of the same import, but differing in suit, might be taken, which would not introduce an essential difference among the sets.

M. De Moivre also gives some observations on this game which he had from an experienced player. See *Doctrine of Chances*, p. 179, &c.

M. de Moivre has also treated of picquet in his *Analyse des jeux de Hazard*, p. 162.

**PICQUET Guard.** See **GUARD.**

**PICQUET-Berg,** in *Geography*, a division of the district of Stellenbosch and Drakenstein in southern Africa, near the Cape of Good Hope. It terminates the plain of the Four-and-twenty rivers to the northward. Here, besides corn and fruit, the inhabitants rear horses, horned cattle, and sheep. And from hence also is sent to the Cape market a considerable quantity of tobacco, which has the reputation of being of the best quality that southern Africa produces.

**PICQUIGNY,** a town of France, in the department of the Somme, and chief place of a canton, in the district of Amiens. The place contains 1253, and the canton 14,125 inhabitants, on a territory of 202½ kilometres, in 22 communes.

**PICRA, HIERA.** See **HIERA.**

**PICRAMNIA,** in *Botany*, so named by Swartz from πικρα, bitter, and βραχης, a shrub, on account of the great bitterness of every part of the plant. Swartz. Prodr. 27. Fl. Ind. Occ. 217. Schreb. 687. Willd. Sp. Pl. v. 4. 761. Ait. Hort. Kew. v. 5. 384.—Class and order, *Dioecia Pentandria*. Nat. Ord. uncertain; perhaps akin to *Rhus*.

Gen. Ch. Male, *Cal.* Perianth of one leaf, in three or five deep, lanceolate, erect segments. *Cor.* Petals three or five, lanceolate, somewhat spreading, longer than the calyx. *Stam.* Filaments three or five, awl-shaped, approximated at the base, erect, longer than the corolla; anthers ovate, two-lobed.

Female, on a different plant, *Cal.* as in the male, permanent. *Cor.* as in the male. *Pist.* Germen (superior?) oblong, rather compressed; styles two, short, recurved, permanent; stigmas simple, acute. *Peric.* Berry roundish-ovate, of two cells. *Seeds* two in each cell, ovate-oblong.

Eff. Ch. Male, Calyx in three or five deep segments. Petals three or five. Stamens three or five.

Female, Calyx and Corolla like the male. Styles two. Berry of two cells. Seeds two in each cell.

Obf. The berry is said to have sometimes, though very rarely, three cells, and solitary seeds.

1. *P. Antidesma.* Ash-leaved Picramnia. (*Berberis fruticosa racemosa, fraxini folio alato, fructu nigro dipyrreno*; Sloane Jam. v. 2. 101. t. 208. f. 2. *Antidesma*; Browne Jam. 123.)—Clusters slender, pendulous. Stamens three. Styles recurved.—Native of Jamaica and Hispaniola; brought to Kew by admiral Bligh's ship in 1793, but it has not yet blossomed. The stem is nine or ten feet high, according to Sloane, as thick as a man's arm, smoothish. Leaves scattered, pinnate, of about seven smooth, elliptical, nearly entire, leaflets. Clusters long, loose, of numerous little yellowish-white flowers. Berries the size of gooseberries, at first red, then black, ripe in November. The negroes esteem this shrub antisyphilitic, and use its infusion as a remedy for the colic.

We quote Willdenow after the Hort. Kew. without having that part of his work at hand, so that we know not whether he describes, as the specific character seems to imply, more than one species.

**PICRIA,** so called by Loureiro, from πικρα, bitterness, on account of the flavour of every part of the plant. Lour. Cochinch. 392.—Class and order, *Didynamia Angiospermia*, or rather perhaps *Diandria Monogynia*. Nat. Ord. *Perforata*, Linn. *Scrophularia*, Juss.

Gen. Ch. *Cal.* Perianth superior, four-leaved, deciduous; two of the leaves ovate, flat, longer than the corolla; two others alternate, linear, shorter. *Cor.* tubular, ringent; tube contracted in the middle; upper lip spatulate, emarginate; lower broadest, in three rounded equal segments.

*Stam.* Filaments four; the two longest erect, separately sheathed with papillary tubes; their anthers of one cell, curved, distant; two shorter inflexed; their anthers connected together, each of two cells. *Pist.* Germen ovate; style the length of the corolla; stigmas two, lanceolate, erect. *Peric.* Berry ovate, inferior, of two cells. *Seeds* very numerous, roundish.

Eff. Ch. Calyx of four leaves. Corolla ringent. Berry inferior, of two cells.

1. *P. Felterra.* Cultivated in the gardens of China and Cochinchina. The leaves are esteemed for their aperient, sudorific, diuretic, and emmenagogue properties; and used in incipient dropsy, intermittent fevers, colics, and various suppressions. The stems are numerous, herbaceous, perennial, eighteen inches high, erect, square, branched. Leaves opposite, ovate, serrated, rough, but not hairy. Flowers pale red, crowded, stalked, axillary, and terminal.—Such is Loureiro's description. We find no notice of this genus in other writers; yet it must be presumed that a plant so generally cultivated, and of so good report as to its medical uses, can hardly have escaped the notice of botanical travellers. Many points indicate an affinity to *Gratiola*, but the fruit being a berry, and inferior, is foreign to that genus, nor can we, by any probable conjecture, reduce Loureiro's plant to any other with which we are acquainted.

**PICRIDIDIUM,** so called from its bitterness, a genus established by Desfontaines in his *Flora Atlantica*, the only two species of which, mentioned by that able writer, are *P. tingitanum* and *P. vulgare*. The first is *Scorzonera tingitana*, the other *Scorzonera picroides*, of Linnæus. Both are removed by Willdenow to *Sonchus*, a measure adopted in the Prodr. Fl. Græc. v. 2. 126; nor can we trace any thing like an essential difference, in the character given by Desfontaines, to separate them from that genus, with which moreover they well accord in habit.

**PICRIS,** from πικρα, bitter, a name for the wild fucory, or some bitter herb of that family. It is well chosen for the present genus, inferior to few of its natural order in this respect. Linn. Gen. 399. Schreb. 526. Willd. Sp. Pl. v. 3. 1556. Mart. Mill. Dict. v. 3. Sm. Fl. Brit. 814. Prodr. Fl. Græc. Sibth. 131. Ait. Hort. Kew. v. 4. 447. Juss. 170. Lamarck Illustr. t. 648. Gært. t. 159. (Helmintia; Juss. 170. Willd. Sp. Pl. v. 3. 1607. Ait. Hort. Kew. v. 4. 461. Lamarck Illustr. t. 648. Gært. t. 159.)—Class and order, *Syngenesia Polygamia æqualis*. Nat. Ord. *Compositæ semiscolulosa*, Linn. *Cichoraceæ*, Juss.

Gen. Ch. Common calyx double; the outer of several flat, lax, converging scales; inner ovate, of many equal parallel scales. *Cor.* compound, imbricated, uniform, of numerous monopetalous, ligulate, linear, abrupt, five-toothed, perfect florets. *Stam.* Filaments five, capillary, very short; anthers united into a cylindrical tube. *Pist.* Germen to each floret nearly ovate; style the length of the stamen; stigmas two, reflexed. *Peric.* none, except the permanent calyx, finally reflexed. *Seeds* solitary, swelling, obtuse, transversely furrowed; down feathery, sessile or stalked. Recept. naked.

Eff. Ch. Receptacle naked. Calyx double; the inner equal; the outer lax. Down feathery. Seeds transversely furrowed.

Obf. The inner calyx is by no means imbricated. Its scales, or leaves, are parallel, close, all of equal length. The **HELMINTIA** of authors, see that article, consists of the first of our species only; its outer calyx has but five leaves, the inner about eight; and the seed-down is stalked. The habit

habit also is rather peculiar; but we are always on our guard against the unnecessary multiplication of genera, that inure to the most accurate observers.

1. *P. echioides*. Bristly Ox-tongue. Linn. Sp. Pl. 1114. Curt. Lond. fasc. 3. t. 51. Engl. Bot. t. 972. (*Helmintia echioides*; Willd. Sp. Pl. v. 3. 1607. *Buglossum luteum*; Ger. Em. 798.)—Outer calyx of five broad prickly leaves. Down stalked. Leaves wavy.—Native of banks and the borders of fields, especially on a clay soil, in England, France and Italy, flowering in June and July. The root is annual. Herb two or three feet high, branched, bright green, copiously beset with rigid pungent prickles, of which those on the disk of the leaves proceed each from a hard tubercle. Lower leaves lanceolate; upper heart-shaped and clasping the stem. Flowers rather large, of a bright golden yellow. The plant abounds with a bitter milky juice; yet Dr. Sibthorp found the leaves in use among the modern Athenians, either raw, as an ingredient of their salads, or boiled as a pot-herb.

2. *P. hieracioides*. Hawkweed Ox-tongue. Linn. Sp. Pl. 1114. Willd. n. 1. Ait. n. 1. Engl. Bot. t. 196. (*Hieracium asperum*; Ger. Em. 298.)—Stem rough. Outer calyx many-leaved, short, lax. Leaves lanceolate, wavy; the radical ones toothed. Down sessile.—Found about dry gravelly banks, and the borders of fields, in the north of Europe; not rare in the chalk or gravel counties of England; flowering in July and August. Root biennial. Herb corymbose and widely spreading, dark green, rough. Flowers yellow, with a broader corolla, but smaller calyx, than the former.

3. *P. japonica*. Japanese Ox-tongue. Thunb. Jap. 299. Willd. n. 2.—Stem hispid. Leaves sessile, lanceolate, hairy, toothed. Flowers paniced. Calyx hispid; the outer one erect.—Native of hills in Japan, flowering in April or May. Stem two feet high, hispid. Lower leaves a finger's length, somewhat stalked; upper shorter and sessile, alternate. Flowers yellow, paniced, on long, naked, hispid, compound stalks.

4. *P. aculeata*. Prickly Ox-tongue. Vahl Symb. v. 2. 89. Willd. n. 3.—Stem very prickly. Leaves elliptic-lanceolate, toothed. Flowers corymbose. Calyx hispid; the outermost lax.—Native of uncultivated hills in Barbary. Perennial. A foot high, rough all over with copious small rigid prickles. Vahl describes it as differing from *P. echioides* in the want of a five-leaved outer calyx; yet he says there is an outer calyx, only all the calyx-scales are linear-lanceolate. Such is the case with every species except *echioides*.

5. *P. pauciflora*. Few-flowered Ox-tongue. Willd. n. 4. Prodr. Fl. Græc. n. 1912.—Stem hairy. Leaves lanceolate, sessile, toothed. Flower-stalks elongated, swelling. Calyx hairy; the outermost lax.—Native of the south of France and of Greece. It was raised in Chelsea garden in 1788, as well as in that of the late Dr. Gwyn at Ipswich, from seeds given to the writer of this by M. Gerard. The root appears to be annual. Stem from eight to twenty-four inches high, more or less branched, spreading, rough with short bristly cloven-pointed hairs, as is all the herbage. Flowers yellow, of an ordinary hawkweed aspect, open in the morning only. Villars's figure of his *Hieracium pappo-leucum*, Dauph. t. 31, is a very tolerable representation of this plant, as Willdenow has likewise noted; but specimens from the author himself prove very different from our *Picris*.

6. *P. asplenoides*. Spleenwort-leaved Ox-tongue. Linn. Sp. Pl. 1115. Willd. n. 5. Vahl Symb. v. 2. 90. Prodr. Fl. Græc. n. 1913. Ait. n. 2. (*Leontodon muricatum*; L'Herit. Stirp. 173. t. 82. *Virea scabra*; Scop. Del. Insul. v. 2. 25. t. 13.)—Stem rough. Leaves oblong-

lanceolate, obtuse, sinuated. Flower-stalks elongated, swelling. Calyx rough; the outermost reflexed.—Native of the sandy sea-coast of Barbary. Perennial. Much larger than the last, with blunt, strongly sinuated, or pin-natifid, leaves; and some of the seed-down is stalked, which greatly invalidates the supposed character of *Helmintia*, as a distinct genus.

7. *P. ruderalis*. Rock Ox-tongue. Willd. n. 6.—Stem hispid. Leaves lanceolate, with fringe-like teeth. Flower-stalks and calyx hispid; the outermost spreading. Found on rocks near Prague in Bohemia. Schmidt. Root perennial, abrupt. Stems several, six inches high, erect, beset from top to bottom with axillary, distant, very hispid flower-stalks. The flowers are small, like *Crepis tetraflora*. Willd.

8. *P. hispidula*. Hispid Ox-tongue. Ait. n. 3.—Leaves oblong-lanceolate, nearly entire, sessile, hispid, as well as the calyx, with hairs barbed at the point.—Native of the Levant. A specimen in the Banksian herbarium, it is said, shews this plant to have been cultivated before 1789, in the gardens of England. It is marked as a hardy perennial, flowering in July and August. We have had no opportunity of examining this species, but we greatly suspect it to be no other than our *pauciflora*, whose pubescence answers to the description, and which we believe was communicated to Sir J. Banks, as well as to Kew garden, in 1788 or 1789.

PICRIUM, from πικρὸς, bitter, an appellation for which Schreber has exchanged the barbarous *Coutoubea* of Aublet. Schreb. Gen. 791. Mart. Mill. Dict. v. 3. See EXACUM.

PICROTOXINE, in *Natural History*, a name given by M. Bouley to a peculiar substance, which he extracted from the "Cocculus indicus," and to which that substance owes its deleterious qualities. It may be obtained by the following process. Boil the seeds deprived of their pericarp in a sufficient quantity of water; filter the decoction, and precipitate it by acetate of lead; then filter again, and evaporate slowly to the consistence of an extract; dissolve this extract in alcohol, and evaporate the solution to dryness. Repeat these solutions in alcohol and evaporation, till the residue is wholly soluble in alcohol and water. It then consists of picrotoxine mixed with a little colouring matter; agitate it with a very small quantity of water, the colouring matter is dissolved, and the picrotoxine separates in small crystals. Its properties are as follow: its colour is white, and it crystallizes in four-sided prisms; its taste is disgustingly bitter; 100 parts of boiling water dissolve four parts of picrotoxine, one-half of which separates as the solution cools; the solution does not alter the colour of vegetable blues; alcohol, of the specific gravity 0.810, dissolves the third of its weight of this substance; a little water throws down the picrotoxine, and the addition of a greater quantity redissolves the precipitate; sulphuric ether, of the specific gravity 0.700, dissolves only 0.4 of picrotoxine; it is insoluble in oil, both fixed and volatile; diluted sulphuric acid does not act upon it; concentrated acid dissolves it, assuming a yellow colour; when heat is applied, the picrotoxine is changed and destroyed; nitric acid dissolves it without the disengagement of nitrous gas; the solution is yellowish-green; when heat is applied, the picrotoxine is converted into oxalic acid; but about eighteen parts of nitric acid are requisite to produce this effect:—muriatic, oxymuriatic, and sulphureous acids, do not act upon it:—acetic acid readily dissolves it:—carbonate of potash precipitates it from this solution unaltered:—potash, soda, and ammonia, diluted with ten times their weight of water, readily dissolve picrotoxine:—when triturated with potash, it assumes a yellow colour, but does not emit the odour of ammonia:—

when heated, it burns without melting, or flame, exhaling a white smoke, which has a resinous odour:—when distilled, it yields very little water, and gaseous products, but much yellow-coloured impyreumatic oil, and a brilliant bulky charcoal remains behind. *Annal. de Chim.* vol. 80.

PICTA TOGA. See TOGA.

PICTAVIENSIS, or PICTONUM *Colica*, the *colic* of *Poitou*, called also the *painter's colic*, *Devonshire colic*, and, in the West Indies, the *dry belly-ache*, is now known to be occasioned solely by the poison of lead, and is more properly called the *saturnine colic*. See COLICA.

PICTOU, in *Geography*, a growing settlement of Nova Scotia, in the county of Halifax, built on the bay of Pictou, on the N.E. coast of the province, nearly opposite to the S.E. end of the island of St. John's, and about 100 miles distant from Halifax, with which it has a free and speedy communication. It contains 40 houses, and 500 inhabitants, mostly Scots. Formerly it was inconsiderable, but now is the most flourishing place in the province. Its trade consists chiefly in the exportation of timber, annually shipped to Great Britain and Ireland, in return for which are imported dry goods.

PICTS, in *History*, a denomination given to the inhabitants of the eastern parts of Scotland, concerning whose origin, the etymology of their name, and various particulars relating to them, antiquarians, after all their researches, have been divided almost to the present day; though we have reason to believe, that the principal questions in dispute with regard to these people are now nearly settled. The first mention of them under this denomination occurs in a panegyric of Eumenius, the orator, during the year 297, and again in 308; who, referring to Constance's arrival in Britain in 306, for the purpose of repelling the Caledonians and "other Picts" (*Caledones aliique Picti*), expressly and significantly represents them as the same people. The Caledonians had been often mentioned before by classic authors, under other names; but on this occasion they were called Picts, on account of their peculiar seclusion from the Roman provincials on the south; and they were often mentioned, during the decline of the Roman empire, by orators, historians, and poets, under that significant appellation. As the learned professor of Autun knew the meaning of his own language, says Mr. Chalmers, we are bound to regard the Caledonians and Picts as the same people, at the end of the third century. Towards the conclusion of the fourth century, Ammianus Marcellinus (l. xxvii. c. 7.) spoke of these people in the same manner. The poets also, referring to the custom of painting themselves, that prevailed among the Caledonians, and perhaps erroneously imagining that they were on this account called *Picti*, confirm the same opinion. Thus Claudian, about the year 400, "De Bello Getico," alludes to them in the following lines:

"—— ferroque notatos  
Perlegit exanimos Picti moriente figuras."

And in his panegyric on Theodosius's victories, he again thus speaks of the Picts:

"Ille leves Mauros, nec falso nomine Pictos  
Edomuit."

It appears, therefore, from the mention of classic authors, during three centuries, that the Picts were Caledonians. That the Caledonians were the North Britons, who fought Agricola, at the foot of the Grampian, we know from the nature of the events, and the attestation of Tacitus; and that the Northern Britons of the first century were the descendants of the Celtic aborigines, who were the same

people as the Southern Britons, during the earliest times, has been satisfactorily proved, says Chalmers, as a moral certainty.

At the period of the Roman abdication, A.D. 446, when the Pictish period commenced, the sixteen tribes of Picts, under this appropriate denomination, ranged unsubdued beyond the wall of Antonine, and acquired from their independence higher importance, when they were no longer overawed by the Roman power. By degrees they became the ruling nation, and retained their dominion throughout four centuries of the North British annals, *viz.* until A.D. 843, when the Pictish period terminated. It has been a subject of dispute, as we have already intimated, whether the Picts were of a Celtic, or of a Gothic origin; but it has been shewn, on the most satisfactory evidence, that their genealogy may be clearly traced through three successive changes; from the Gauls to the Britons; from the Britons to the Caledonians; and from the Caledonians to the Picts; thus changing their names, but not their nature. The venerable Bede, who was contemporary with the Pictish government, speaks doubtfully of the Picts, as the second people, who came into this island from Scythia; first to Ireland and thence to North Britain, and many later writers have been misled by his authority; but it has been since concluded, from more accurate examination, that the Picts were undoubtedly Caledonians, that the Caledonians were Britons, and that the Britons were Gauls, or Celts. Towards the conclusion of the third century, the Caledonians acquired the comprehensive appellation of Picts; and this appellation, before the end of the fourth century, superseded every other name. Some writers, indeed, maintained, with Buchanan, that a great part of North Britain was, even before the invasion of Britain by the Romans, inhabited by a people called Picts, Piks, or Pechts, who are thought by some to have migrated from Scandinavia, and to have driven out the ancient inhabitants; nevertheless it is said, that they were a Celtic colony, and spoke at least a dialect of the language of the original inhabitants. But for these assumptions there seems to those who have been industrious in their researches no sufficient authority. Camden, whose testimony commands deference and respect, is the first person of eminence who avowed it as his opinion, that the Picts were the genuine descendants of the ancient Britons; and Selden, having duly considered the subject of the origin of the Picts, advises the reader, rather to adhere to the learned Camden, who makes the Picts very genuine Britons, distinguished only by an accidental name. Different etymologies have been given of the name *Picti*. The most probable opinion is, that these distinguished descendants of the Caledonians acquired this name, during the Roman period, from their relative situation, and local qualities, as compared with the romanized Britons, who lived in the province of Valentia, within the Roman wall; whereas the Picts dwelt without the province, and roamed free from the Roman authority, and separated from the romanized tribes within, who often felt their rigorous incursions, and frequently required the protection of the Roman government. In the British speech, the Picts were from these distinctive qualities called "Peithi," which was naturally latinized by Roman writers into "Picti," when, during the third century, they came to be the objects of Roman observation, by assimilating the British term to their own familiar word "Picti," which was descriptive of the custom of painting the body, seen by the Romans among the Northern Britons. "Peithi" in the British language signifies "those that are out or exposed," "the people of the open country," or of the waste and desert; and also those "who scout, or lay waste." Accordingly the "Peithi" and "Peith-wyr" are the terms commonly

commonly used by the Welsh poets for the Pictish people; and on the confines of Wales, those Britons who threw off their allegiance to their native princes, and set up a *regulus* of their own, or adhered to the Saxons, were called "Peithi" or "Picti." Moreover, the Welsh, in order to distinguish the northern from the southern Picts, called the Caledonian Picts by the appellation of "Gwyddyl Pichli," or "Fichli;" the *p* of the British being often changed into *f*. We may here add, that the Welsh, as Owen observes, in his Dictionary, apply the term "Brython," and Brythonig, to the Picts, and hence it has been inferred, that the Welsh considered them as Britons.

Innes, in his "Critical Essay," has given from an ancient chronicle a series of the Pictish kings, comprehending forty, who succeeded one another from Druid, the son of Erp, A.D. 451, to Bred, the last, A.D. 843. These Pictish kings successively governed uncivilized clans, during the rudest ages. In the third century, they were in a high degree barbarous; but in process of time they gained some improvement from their intercourse, either civil or hostile, with the romanized Britons, or Roman armies, and still more from the introduction of Christianity among them.

The appropriate country of the Picts acquired different names, in successive periods. The mountainous part of it was denominated by the first colonists in their native speech "Alban," *i. e.* the superior height. This appellation, originally applied to the hilly region that forms the west of Perth, and the north-west of Argyle, was in subsequent times extended to the whole country. In the first century, the British term "Celyddon," literally signifying the "Coverts," was applied by the Roman authors to the whole country on the N. of the Friths, though the same name was restricted by the Roman geographers to the interior highlands, lying northward of Alban: and both these appellations were afterwards applied more largely to North Britain. The Pictish chronicle, from the Pictish people, called their country "Pictavia." The annals of Ulster generally mention this country under the name of "Fortruin," derived, with a slight variation, from "Fother," the name of the Pictish capital. Saxo, the Danish historian, plainly refers to "Petia," as the name of Pictland; and this "Petia" of Saxo approaches the nearest to the British term "Peith," or "Peithw," which the British people applied to the open country, lying along the east coast, on the northward of the Forth. In the sequel of this article, we shall merely mention some incidental circumstances that occur in the history of the Picts. The reign of Bridei was rendered illustrious by his conversion to Christianity, under the instruction of Columba, in 565. From this epoch, the Picts may be considered as Christians, though this change in the profession seems not to have produced any considerable alteration in their principles, or their customs. About the year 724, a civil war commenced among the Picts, and they were at the same time exposed to the destructive incursions of their enterprising neighbours, on the north-east. The anarchical governments of Norway, Sweden, and Denmark, during the middle ages, produced the pirate kings of the northern seas, and these were for a long time the scourges of the navigators, who sailed from every nation, on the European seas. In 839 the Vikings, as they were called, landed among the Picts, and a bloody conflict ensued, which proved fatal to many of the Pictish chiefs. Weakened by domestic strife, and by a formidable invasion, the Picts were unable to resist the arms, or to defeat the policy of Kenneth, the son of Alpin, when he acquired their distracted government, A.D. 843.

With regard to the *language* of the Picts, it has been

observed, that as they were merely the Cambro-Britons, who appeared at various periods under a new and lasting name, the speech of the Britons and of the Picts must have been the same. Accordingly Aber-nethy, the metropolis of the Pictish kingdom, derived from the British language its appropriate appellation, which it retained till the latest period of the Pictish government; and upon investigation, which we have not room to pursue, it has been found that the most ancient repertory of Pictish language is the topography of North Britain. The Pictish language may also be traced in the vernacular language of North Britain even at this day: and the municipal law of that country has even borrowed several of its significant terms from the Pictish speech. This language of the Britons and Picts has been considered, by judicious writers, as masculine, copious, and poetical. Although from not seeing it, in its primitive orthography, it seems to be harsh, in its sounds, to the ears of strangers, yet, when it is put into verse, and is read with its genuine pronunciation, it is, like the Greek and the Hebrew, melodious and strong. As the Celts were the original settlers of Western Europe, they transmitted to their posterity an energetic passion, for imposing their own significant names on all the prominent objects of nature. In exercising this peculiar prerogative of first discoverers, they displayed those appropriate qualities of their language, which have been remarked; its strength and discrimination, its copiousness of epithet, and its frequency of metaphor. In the subsequent progress of the Gothic tribes over Europe, they adopted the names of mountains, rivers, &c. which had been imposed upon them by the Celts who had previously occupied the countries of which they took possession; and the Saxons, who settled in Britain, were prompted, by their poverty of speech, to follow the example of their Gothic fathers. The Anglo-Saxons, who, in more recent times, acquired settlements in North Britain, borrowed many words from the Celts and Britons, and Scoto-Irish, which have maintained their place, and which give strength, copiousness, and ornament to the Scoto-Saxon of the present times.

The *religion*, as well as the *language*, of the Picts, derived its origin from those of the Gauls; and hence we may conclude that the Picts and the Britons were the same people, as well as from the identity of their speech, topography, and monuments. The tenets and the forms of the Pictish religion were Druid in the sixth century; as we know from a thousand relics of stone that still engage attention within the district of the Pictish country. The modes of sepulture were the same among the Picts as those of the Caledonians, and the sepulchral rites of the latter were the same as those of the Britons. Their hill forts, their weapons of war, their ornaments, and their modes of life, were the same as those of the Caledonian Britons, of whom the Picts were the immediate descendants. That the Caledonians and Picts were the same people is now universally allowed. Buchanan, Camden, Lloyd, Jones, the M'Phersons, O'Connor, d'Anville, and Stillingfleet, however they may differ in other points, are here all agreed. But some have asserted, without proof, and against probability, that the Caledonians were a Gothic colony, who conquered North Britain in some unknown age. With regard to any Gothic expedition for this purpose, history is silent. Few questions have engaged more general attention among learned antiquaries than that of the origin of the Picts. Mr. Chalmers has given a minute detail of the different opinions that have been maintained with regard to this question; and he concludes with adducing the testimony of the learned antiquary. Mr. Edward King, the author of the "*Munimenta Antiqua*;"

tiqua;" who maintains, that the Picts were descended from the aboriginal Britons. With him concurs the late Dr. Henry, who says, that we hear nothing of any invasion of the Caledonians by any such distinct people as the Picts; and he therefore concludes, as Innes had done before him, that this denomination was merely a new name, which was given to the old settlers. Upon the whole, Mr. Chalmers observes, the twenty-one British tribes, who occupied North Britain during the first century, remained for ages in their ancient settlements. Five of those tribes were subdued by the Roman arms, and civilized by the Roman arts. After the Roman abdication, these five tribes continued, in their appropriate country, on the south of the Friths, distinguished by no other circumstance than their civilization from the sixteen tribes, who equally remained unsubdued on the north of the same Friths, and who obtained the name of Picts. These were as much the descendants of the Cambro-Britons as their southern neighbours of Strathclyde, who were noticed, till recent times, as genuine Welsh.

Upon the death of Bred, the last Pictish king, A.D. 843, Kenneth, the son of Alpin, king of the Scots, obtained the Pictish government; in his person a new dynasty commenced: the king was changed, but the government remained the same. The Picts and Scots, who were a congenial people, from a common origin, and spoke cognate tongues, the British and the Gaelic, readily coalesced; and the union of the Picts with the Scots, A.D. 843, conjoined the separate dominions of both, and led on to the annexation of other territories. The Picts had been confined, for ages before that epoch, by the Forth on the south, and Drumalban on the west, and by the German ocean on the east and north. Their southern limits had been fixed at an early period by the prevalence of the Roman power. They were induced, probably by the long continuance of that power, to consolidate the distant districts of the various tribes, which had, from the earliest times, divided their country, by their spirit of independence, and enfeebled their strength, by their desires of revenge. Tradition reported, even so lately as the twelfth century, that Pictavia had been once separated into six kingdoms. But these fictitious monarchies had long ceased to exist before the memorable union of the Picts and Scots, except in the natural divisions of the country, as they had been named by a Celtic people. The Scots, at that epoch, possessed the whole western coast, from the Clyde to Loch-Toridon, with the adjacent isles. In the days of Bede, their colonies extended from the northern margin of the Clyde, along the shores of the Irish sea, far into the north: and in the course of another century, they occupied the ample extent of Argyle, from the river Clyde on the south to Loch-Ew and Loch-Maree on the north, and from the sea on the west to Drumalban on the east. Such were the dominions which the Scots brought with them, when, by overpowering the Picts, an union was effected between them, both of authority and of territories. Chalmers's Caledonia, vol. i. See SCOTLAND.

Picts' Wall, in *Antiquity*, a famed piece of Roman work, begun by the emperor Adrian, A.D. 124, on the northern bounds of England, to prevent the incursions of the Picts and Scots.

At first it was made only of turf, strengthened with palisadoes, till the emperor Severus, coming in person into Britain, repaired it, as some say, with solid stone, reaching eighty miles in length, from the Irish to the German sea, through Carlisle and Newcastle; with watch-towers garrisoned, now called castle-steds, at the distance of a mile from each other.

It does not appear, with sufficient evidence, that Severus's

wall was formed of stone: Bede expressly asserts the contrary, though Spartian intimates that Severus built both a *murus*, i. e. a wall of stone, and a *vallum*, or a wall of turf. Bede's words are these: Severus, after several great and difficult engagements, thought it necessary to separate that part of the island which he had recovered, from the other nations that were unconquered; not with a *murus*, as some think, but with a *vallum*: now a *murus*, says he, is of stone; but a *vallum*, such as they made round a camp, to secure it against the attacks of the enemy, is made of turf, cut regularly out of the ground, and built high above ground like a wall, with the ditch before it, out of which the turf has been dug; and strong stakes of wood all along the brink. Severus, therefore, drew a great ditch, and built a strong earthen wall, fortified with several turrets from sea to sea. The learned Camden adopts this opinion; and adds, that Severus's wall is expressed by no other word than *vallum*, either in Antoninus or the Notitia. *Camd. Brit. vol. ii. p. 1045.* See AGGER.

This wall was ruined several times by the Picts, and often repaired by the Romans. At last Ætius, a Roman general, ordered it to be rebuilt of stone, about the year 420; but the Picts ruining it in the year following, it was no longer regarded but as a boundary between the two nations. The wall was eight feet thick, and twelve high from the ground: it ran on the north side of the rivers Tyne and Irthing, up and down several hills: the tract, or remains of it, are to be seen to this day in many places, both in Cumberland and Northumberland.

The inhabitants of the country pretend, that there was a brazen trumpet or pipe, so artificially laid in the wall between each castle and tower, that upon the apprehension of danger at any one place, by the sounding of it, notice might be given to the next, and then to the third, &c. whence it derived the ancient name *cornage*; and in the inside a fort of fortified little town, now called Chester, the foundations of which appear, in some places, in a square form.

PICTURE, an imitation or representation by lines and colours of any natural object. Such representations are also called paintings, from the name of the art by which they are produced; which being capable of general application, and of great influence upon the mind, has, at all times, since men have cultivated their intellectual powers, been regarded with peculiar interest.

Were that art employed merely as ornamental, as the amusement of leisure time, or an agreeable source of innocent delight, we could not regard it as unworthy of attention; but when considered as an useful instrument of instruction, an universally intelligible means of communicating ideas, with all the force, the brilliancy, and sublimity of poetry, and with some advantages superior to those possessed by that divine art, it claims undoubted respect.

The well-known aphorism of Hippocrates, that "art is long, and life is short," applies to no peculiar art so well as to painting; since not only has no single man unaided been able to carry it to perfection, but in the progressive accumulation of knowledge through the lapse of ages, succeeding ones benefiting by the experience and examples of the former, no man has yet arrived at that degree of excellence in the practice of it, which a perfect union of all its principles and qualities would produce.

The power of exercising this useful and delightful art has, at all times, been slow of acquirement, as the history we have given of its progress under the article PAINTING evidently shews. It has this diversity in its growth from that of poetry; which has shone with conspicuous lustre at very early periods of human culture, whilst painting has never flourished,

## PICTURE.

flourished, but in gradual advance with the general improvement of mankind; and has been truly conspicuous only at those times, when the arts of civilization have risen to their highest pitch of excellence in the countries where it has been practised.

In no art has the professor greater or more numerous difficulties to encounter than in painting: since he not only is under a necessity, equally imposing as is the historian or the poet, of obtaining accurate ideas of the events he records, or the scenes he displays; but he has also to invent and perfect himself in the medium, or language, in which he communicates his ideas, before he proceeds to the use of it. This medium is utterly out of the ordinary way of human culture; and whatever may be the aids derived from the advantages we now possess, in having the experience of our predecessors as our guide, there must have been infinite difficulty in bringing it so near to perfection as the great masters have done; and it has been only effected by an extremely gradual progress, and the union of successive exertions operating in one continued line of action. Even now, with the works of preceding painters in our hands, the language of the art (the value and use of its materials) is necessarily, in a very great degree, new to every professor who attains any tolerable degree of eminence. And though it must, no doubt, appear very extraordinary to those who have never made the practice of painting their study, that when such exemplars of art remain to us, men possessed of good sense should hesitate in producing the like; or that, when they are become capable of making copies, perfect almost to deception, they should not be also capable of employing the means they have acquired, in a systematic mode, in works of original invention; yet the reverse, in many instances, is a fact of universal notoriety; and proves incontrovertibly, that the art of painting, particularly when employed upon original matter, is more dependent upon mental exertion, than manual dexterity, in its execution, as well as in its object and effect; and well worthy of the rank assigned it by the Greeks among those arts which they denominated liberal.

Notwithstanding the high degree of perfection to which this art has been carried, no scientific or complete systematic arrangement has yet been adopted for the perfect guidance of the painter; nor does it appear probable that any one ever can be formed, that will effectually apply to the practice of an art such as his, which is capable of such an infinite diversity of character and effect. A man of enlarged mind, carefully consulting the pictures of preceding artists, cannot avoid acquiring information which may assist him in his labour; and it is by this means, more than by regular systematic instruction, that painting has arrived at eminence. But then, the power of extracting valuable information, and of employing it judiciously, even in the practical part of the art, is almost as rare as the superior ones of invention, of composition, or design. Thus, however, as in other arts or sciences, something is ready done to the hands of the painter; he builds upon a foundation laid by his predecessors; but the benefit is derived principally from seeing what may be done, rather than in being informed how to do it. He has yet to discover what colours or materials will most effectively combine to attain his end, even in copying pictures; and when he ventures to attempt the imitation of nature, to trace her varieties and intricacies through the numberless paths of light and shade, and colour, and in all the diversities of view in which objects present themselves, then the whole value of the information obtained by the study of the works of former masters in the practical part of the art, falls still lower in

the scale of utility, from the extreme difficulty of applying it. Perhaps there cannot be a greater proof of the originality of thought required in the mere practice of the art, than the great diversity of the works produced in competition with old pictures, by those who have at different periods admired and studied them enthusiastically. No man of genius, or of good sense, will, however, slight the advantages which the study of them may afford him. He may not, at first, obtain the full and actual information he seeks, but the attempt will lead him in a right way to the discovery of the true principles of art; and time may be saved for their application, which, without such helps, must have been lost in experiment. Without tuition, the only mode of advancement in mental culture is by discovering our imperfections; a mode by no means favourable to rapid improvement, when there is nothing better than our own productions to operate as a corrective. But when good examples are before us, and our first object is to rival them; this advantage, at least, is derived from the attempt, that we set forth in a road which leads to a happy termination, and have no occasion to retrace our steps; like him who starting without a guide, wanders in the mazes of ignorance.

If to acquire possession of the means of the art of painting, the mere power of combining colours in such a manner as to produce imitations, be thus encompassed with difficulties, how great is the task of him who undertakes to unite its higher principles with its noblest aims; and successfully to apply it in extended compositions, illustrative of history, of poetry, or of philosophy. Such has been the exalted and successful ambition of many painters: and their works have proved the beauty, the utility, and sublime power of the art they professed, when exercised by genius, and applied with energy.

To effect this, the hand and the head must equally combine in their efforts. No vulgar or uninformed man, no one who has not taken pains to cultivate and improve his mental faculties, can be a great painter, in the exalted sense in which we view it. Whatever is requisite for the poet or the historian, in cultivation and information, ought not to be disregarded by the painter, whose desire is to exercise his art in an honourable or useful manner, as the great masters among the ancient Greeks and in the more modern Italian schools have done. If it be not required of him to become as learned in natural philosophy as Newton, he ought not to be unacquainted with its principles: his business is not merely with the surface of things, if he wishes to represent their appearances in a sensible and characteristic manner. A knowledge in the sciences, sufficient to inform him of the principles which direct and govern the actions of animals, and cause the various appearances of natural unanimated objects, cannot, or ought not to be uninteresting to him whose whole life is employed in contemplating and representing their forms or their effects. If he knows the natural structure of an animal, its modes and habits of life and action, he at once, and without hesitation, directs his attention to the parts most materially necessary to its delineation; and does not lose his time, as an ignorant person would do, in representing those parts, which, though they may, from accidental causes, strike the eye, yet are, in effect, prejudicial to true character; and if marked too strongly, even with the hand of ability, counteract the effect of those more efficient in general representation, which always ought to be the sole object of him who wishes to be a great painter. In the representation of objects of unanimated nature, a just comprehension of their causes and effects will, in great measure, operate in the  
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same way. We do not mean to say, that if a man happens, for example, to know the cause of a rainbow, or can form a pleasing theory upon it, that he will therefore be able to select and blend, in a proper manner, the colouring substances necessary to paint one with truth and taste: we have already said that this is a matter utterly unconnected with all other species of information: but, if he add to his technical and practical acquirements the scientific one alluded to, he will most undoubtedly set about the task with less confusion of mind than the most ingenious among those who are ignorant of it; and will the more easily satisfy himself of the tones to be employed; and, of course, be more fully assured of its propriety when done, and know when to leave his labour with greater certainty of success.

To this knowledge of the principles of nature, an unremitting attention to her productions is absolutely required of the painter. To him whose mind is devoted to the art, no scene can be vacant or uninteresting; every place affords him matter of observation and investigation. All appearances of natural objects, from the simplest to the most awful; all the actions of man, the varied expressions of his countenance, when under the influence of his passions; the characters of health, of age, of beauty, and even deformity, are entitled to his regard, indeed demand his closest enquiry into their most characteristic lines and effects. All the varieties of country, the characteristic forms of animals, trees, rocks, &c. &c. ought necessarily to be known to him; in fact, there is no object the observation of which may not, either immediately or collaterally, be useful to him. The trouble which attends this constant application of the mind, is in the end most highly rewarded. His sphere of vision is enlarged, almost to the creation of another sense, unknown to those who are uninitiated in the art, which finds continual nourishment in scenes even of apparent dulness and insipidity: imagination is strengthened by it, as the power of creating new images increases in proportion to the store of ideas he acquires; and the power of invention or combination, with whatsoever degree nature may have blessed him, is rendered so much the more effective, as he is careful and active in observation; whereas it would be utterly useless, or worse, if not thus supplied by a well digested mass of materials, raised by continual study of nature; particularly of the beautiful, the grand, the interesting, and the characteristic.

This union of general knowledge with practical ability, may be regarded as the material, or the body of the art, the servant of its more exalted and spiritual essence, the power of invention and expression, by which alone the charm of the art is acquired and imparted. In vain may the most skilful operator combine his colours, and arrange his lines; or the most scientific composer determine his groups, and perfect his forms, in exact imitation of nature, if a vivid and correct invention, amply supplied with the stores of nature and of art, has not formed the basis of the work; and if an enthusiastic feeling of expression does not pervade every part, and add, with its glowing energy, the true and forcible impression of life, of motive, and of motion.

To this end, the nature of the subject is the only proper guide; the little that can be taught being quite unavailing, if not directed by feeling and the principle of the subject. Rules are allowed to controul in the arrangement of inferior matters; indeed it is only by science, that scenes of common, or still life, become interesting; but whenever expression, action, character, are required, when the object is, to develop sentiment, to create

emotion, or impress with sublimity, the prime governing power must be the original impression made upon the artist's own mind, and emanating from the subject; to which rules must be made subservient, systematic arrangements must give way, and whatever can be supplied by commonplace tuition, can only be appealed to in a minor degree.

The basis of the art of painting is imitation: its object, when it is best employed, is to excite emotion. The pleasure or pain which it is capable of exciting, rests not, however, altogether upon actual imitation; since all the moral purposes of the art may be effectually answered by lines only; at least, all that can be imparted by the action and expression of figures. (See *OUTLINE*.) It is sufficient for those purposes, that a hint intelligible to the understanding be given, by which the mind is filled with idea sufficient to fix its attention. Hence arises the notion, which has been supported and opposed with considerable power by men of talents, that an union of the qualities of the different schools of painting would be injurious, instead of beneficial, to the practice and effect of the higher object of art. (See *PAINTING*.) It is a certain fact, and allowed by both, that too close an imitation weakens the sentiment of a picture; abstracts the mind too much from the object to fix it upon the means; and by dividing the interest, diminishes its power. We do not mean by too close an imitation, that narrow view of nature, which, without selection, takes men and things as they are, and copies defects and beauties with equal fidelity; but would extend it to the most perfect system of combination and selection, unless wrought upon the general principles of ideal nature. (See *IDEAL*.) Yet it is not in the quality of the imitation the danger lies, so much as in the degree; and we perfectly agree with those who are in favour of truth in colour and effect, as well as form: and know no reason why the imperfect colouring of the Florentine, or any other school, should be an allowed medium, through which, by incorrectness, the mind should be made to conceive of what is right; in preference to another, which, without disturbing the imagination by presenting images too minutely just, yet has its basis in correct imitation.

Nothing can justify the impropriety of attempting to make falsehood the source of truth. It has by no one ever yet been made apparent, that an hieroglyphic is more emphatic than a true image; and till that is done, we must be excused from believing that a false imitation of nature can be substituted, with equal effect, in place of a just one. Whatever is introduced must, of course, be subject to the governing principles of the art in chiaro-scuro and tone of colour; and also in the degree of imitation, or of advance towards the appearance of absolute projection and reality; and these all depend entirely upon the nature of the subject. But what is done, ought surely to be founded upon the general principles of nature, and not upon a fictitious substitute, which perhaps may have originated less in choice than necessity. The limited number and kind of the colours employed in fresco, together with its peculiarities of execution, forbade, for a while, any great degree of richness, or brilliancy, or of truth, in colouring, but we have many specimens to prove, that when more beautiful, more artful, and true colouring was effected by the use of oil, that the great masters themselves of the Florentine and Roman schools attempted, as far as possible, to impart something of it to their frescoes. Raphael's pictures of the Heliodorus and the Miracle at Bolsenna, are very striking examples of this fact, that true, though general imitation, was the guide of his pencil; and still more did he exhibit his sense of its value in his picture of the Transfiguration; and

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in almost all his productions in that medium which permitted the attempt freely. Even M. Angelo sought to unite the richness, vivacity, and reality of Titian's colouring, with his own grandeur and simplicity of design, by employing the pencil of Sebastian del Piombo, and others, upon his own compositions.

We cannot conceive that the great style of design may not have its appropriate tones of colour true to nature, yet suitable to its dignity and simplicity in form; and probably Sir Joshua Reynolds and Mr. Opie, who stand opposed to each other in opinion in this matter, may not, in reality, so widely differ, as at first sight they appear to do. The former asserts in his fourth discourse, that "there are two styles of historical painting, the grand style," (that of the Florentine school,) "and the splendid or ornamental," (that of the Venetian); and again, "that the great style stands alone, and does not require, perhaps does not well admit, any addition from inferior beauties." Had he not in a former part of the same lecture asserted, "that the pictures of the Venetian school were not only too brilliant, but also too *harmonious*, to produce that solidity, steadiness, and simplicity of effect, which heroic subjects require," and which simple and grave colours only can give to a work, there would have been no reason to conclude from the other remark, that he thought truth of imitation, with certain limitations, inimical to that grandeur of impression required: and when it is considered, that he is speaking of the characteristic distinctions of the two styles, and has previously declared, that he wished it to be understood, "that in speaking of the Venetian or ornamental style he excluded Titian, who had a sort of senatorial dignity about him, particularly in his portraits," and meant only the works of P. Veronese and Tintoretto; and that, in another place, he declares it to be his opinion, that "the tone and style of colour of Ludovico Carracci is the proper vehicle for historic art," we cannot believe that his mind could be made up to the approval of the dry, hard, and imperfect management of colours exhibited in the general style of the large fresco pictures of the Florentine and Roman schools, when compared with the truly fine efforts of imitation by Titian, or even some of those works themselves more perfect in harmony, depth, brilliancy, and truth. It appears most probable that his ideas of dissonancy, were principally attached to those peculiarities which distinguish the styles; where they turned aside from nature, to mark more strongly their peculiar objects; and which separate completely and necessarily the severity and purity required by the one, from the luxuriance and sensuality attached to the other.

To this opinion Mr. Opie assents, when he cautions the painter to "beware of losing the terrors of the crucifixion, in the magnificence of a triumphal show; or of disturbing the pathetic solemnity of the last supper, with the impertinent gaiety of a bacchanalian revel;" and justly observes, that "the grand style consists not in neglecting to give all the apparent truth, force, and reality of objects to the eye; but in supplying the defects, and avoiding the redundancies, of individual and imperfect forms;" and adds, that "colouring is not less capable, by rejecting what is merely accidental, and copying only the general and characteristic hue of each object, of being elevated to the same ideal standard."—"One simple and refined principle operating equally on all parts of the art," must surely produce a correspondent effect in all; and there is no apparent reason, why the same system of operation, which, whilst it elevates, still maintains design in purity, should not produce in colouring a correspondent degree of expression, of simplicity,

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and of truth; without violating harmony, or presenting discordant and harsh contrasts in shades and colours.

We must again repeat, however, that the *degree* of imitation is the essential part for consideration, as being that wherein the difficulty lies. If colours are to be reduced in their tones, and made serious in their effect, to suit the dignity of historic design, they may be reduced as twilight reduces them, in which forms and colours together are seen only in general masses. The St. Peter Martyr by Titian, is a fine exemplar of that kind of effect; grand and imposing, yet true. Time has indeed produced some changes in the effect of that work, but the principle of imitation remains discernible to a well-informed eye, and is broad, yet just; simple, yet effective and rich. The execution of the inferior parts is not, as has been said by a learned critic, (see Edin. Rev. Aug. 1810, art. Barry,) wrought "with all the accurate truth of a botanist;" and if they were so executed, it would, as Sir J. Reynolds has more justly said, only be labour wasted. They have truth in character, but not minute botanical markings; and it perhaps would puzzle a botanist to do more than point out the genus of the plants upon the fore-ground. Nature, however, is evidently the guide, and Titian has only omitted those parts which, if he had imitated them, would never have been seen at a proper distance for viewing the picture, and which being unnecessary, must have diminished the general interest if made observable. They are not even seen in nature minutely, when the eye is not immediately directed to them, but is attached to some peculiar object which they surround; and the imitation of them therefore ought to be general, as the natural impression is; if it is wished that the principal object should remain undisturbed in effect.

But however interesting and agreeable, perfect and full imitation in colour, and light and shade may be, yet wherever it is intended to produce a great or sublime effect, it must be remembered that form is the most effective agent which painting can employ. Sir Joshua Reynolds, fully conscious of its value, has said that "he who is capable of delineating fine forms, even if he can do nothing more, is a great artist;" and in perfect consonance with this opinion, the principal object of all the greatest masters has been to acquire a knowledge of the forms of natural objects, and the power of delineating them. Annibal Caracci is said to have told his scholars, "first to make a good outline, and then, however the middle be filled up, it must be a good picture." This, however, must be regarded as a freedom of speech, too loose to be followed to the letter; yet it conveys his strong sense of the powerful necessity of employing skilful design,—the original foundation and the most useful principle of the art; without which, the others are completely nugatory.

This simple principle, which apparently offers little difficulty to be overcome, requires, nevertheless, the deepest study, and the most constant practice, in order to obtain its two most important requisites,—correctness and expression. The only mode of acquiring these, is derived from that general study of nature which we have spoken of above. No man, for instance, can draw the human figure in such a mode, as to correspond with either of those terms, who is not well versed in the anatomy of it; not even when it is in a tranquil state: how much less so then, when it is animated and in motion; when the agitations of the passions extend, or contract the limbs; or the gentle sentiments of affection cause them to play in graceful undulation. Without the knowledge of the structure of the bones, the forms and attachments of the muscles, and their consequent varieties of ac-

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tion, he must necessarily confound the essential with the useless; the solid, unchanging, and characteristic forms, with the integuments that encumber them and disguise their action.

It is not, however, in outline alone, that the understanding of form is requisite to the painter; since in a style correspondent to the character which that possesses, should the space it circumscribes be wrought by the *chiaro-scuro*, which comes next in value among the principles of the art, and by which the form suggested to the fancy by outline is rounded, made to project from the ground, or from other forms, to obtrude itself upon the notice of the spectator, or recede and fall back from the view. (See *CLAIR-OBSCURE*.) The passion or the action which the drawing of the outline presented, may be in most cases greatly assisted by this branch of the science of art; as in poetical scenery, for instance, and whatever depends upon illumination in tone or degree. Scenes of horror and obscurity, which participate of the mysterious or sublime; and the enchanting bland effects of serenity and repose, alike find in *chiaro-scuro* their main ornament and support; though colouring, when judiciously applied and conducted, is that which lends the finished perfection of the art, and completes the degree of illusion which is its aim. See *COLOURING*.

The best mode of acquiring the practical part of painting, is certainly, in the first instance, to copy the works of good painters, under the guidance of an able instructor. Slight, however, in comparison with the object, is all that tuition can afford in this matter. The arrangement of the palette, the preparation of colours, the general principles of their union or opposition, and consequently the order of their most agreeable arrangements and most powerful effects, together with the best or readiest mode of exercising the implements of the art, may of course be communicated and learnt. The mind may be directed to seek for refinement in taste of form and colour, and to select and combine them; but will be taught in vain, unless nature has implanted the seeds of discrimination, of judgment, and of taste itself. And even if somewhat of this should be imbibed, vain is every effort to impart imagination, invention, or the feeling of expression: these are qualities, improvable, when possessed, by exercise and study; but not to be created by the power of man. To those who possessing them, feel the inclination to study the art of painting, we would say,—the true mode of learning to rival the successful efforts of the great masters, is not by copying servilely the surfaces of their works; but when the power of execution is in part obtained, endeavour, while copying, to search into the principles by which compositions are arranged, and upon which their execution is effected: wherein consist, and what are the peculiar features of colour, or of handling, that give the character of grace and taste expressed in them; and what peculiar traits of imagination most beautifully and most justly develop their subjects. In investigating pictures with views dictated by such desires, it will frequently be found, that what appears to superficial observers mere freaks of fancy, or mere recreation or indulgence of the pencil, is the result of the most deeply inventive faculty, and admitted, not for pleasure only, but for the most important purposes. Such, to instance in a work open every season to the inspection of artists by the liberality of the marquis of Stafford, is the little vase in the middle of Titian's picture of the bath of Diana. To the common observer it presents, as intended, a proper accompaniment to the toilette of the goddess, perhaps a vessel containing perfume, no matter whether disposed of here or there, provided it were introduced; yet more an ornament than a necessary

adjunct in the composition: in the eyes of the artist, it is beheld as an instrument of inestimable value, in preserving the brilliancy and richness of flesh in full, yet just character, by its own superior power of reflection; and producing a brilliant focus to the light of the picture, without attracting the eye too powerfully to itself; not to speak of its interrupting, by its beautiful form, the too great regularity of the mass of stone-work on which it stands. It should never be forgot, that painting is more a work of the mind, than of the hand; it is the former which creates, the latter only displays; and though the art consists, absolutely speaking, in that display, its value is nothing, if not supplied with well selected, well arranged materials; and is comparatively of easy acquirement, as is testified by every day's experience. We must not be thought to undervalue the benefit of copying. It seems almost absolutely necessary, under judicious management, to perfect the hand, and shorten the labour necessary for acquiring the practical part of the art, and therefore the more early in life it is begun the better; and if, while the hand is engaged in the labour of it, the mind be employed in developing the principles upon which the work is conducted, then there is the chance of advantage being derived from the necessity of devoting so much time to one object; as it affords the opportunity of deeper and more solid investigation. One thing is certain, that there is no mode of obtaining excellence in painting but by a regular and steady pursuit. Let the original foundation of genius and talent be as good as it may, nothing short of persevering industry can raise the superstructure. "There is no royal road to the arts," no short cut whereby the painter may arrive at the end of his course, and escape the labours of study and exercise; and of this the practice and declarations of the very greatest artists are satisfactory proofs. Apelles, it is said, never allowed a day to pass without exercising his art in a greater or less degree. The industrious exertions of the most able of the Italian artists are on record: and our own great example, sir Joshua Reynolds, is a host in himself: the immense quantity of his works amply testifying his industry, as well as his attachment to the art. Indeed, without that entire devotedness which supercedes, though it does not exclude, all attention to other objects, it is impossible to obtain that facility of hand, or intelligence of mind, which resorts to the proper sources for a supply of materials to fill the canvas, to improve or embellish a composition, to supply deficiencies or correct defects, by a prompt and happy recollection of the most appropriate objects in form or colour.

The power of execution in painting being secured, the next step is to invent compositions, and execute the parts from nature; combining them with the principles of the art. Then comes the proof, whether the student has felt in his previous studies like an artist, or only as a man possessing no higher qualifications for his profession, than those with which his fellow mortals in general are endowed. Our exhibitions inform us too frequently of the misguided hopes and labours of numerous classes; and gratify us but rarely with any prospect of future excellence or originality; manifesting, by the woeful disappointment and ruin of hundreds, the rarity of the peculiar talent which leads to perfection in painting, and the difficulty of attaining any great degree towards that point, even by those endowed with taste and sense to feel and practise the art with great ingenuity.

It is an advantage to those who are so favoured, if they endeavour to look forward beyond the skill exhibited by others,

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others, and aim at improving even upon the practice of their predecessors. They at least who hold this course are more likely to do something meritorious than others, who fear to launch out of the beaten track: and if their works are conducted upon sound principles, with elevated ideas, and freedom in execution, though they may fail to obtain the object of their wishes; yet they have the best chance of soaring above mediocrity, and the most reasonable ground to hope for applause.

There is, however, a danger attending this ambitious adventure; it is that of mistaking novelty for improvement; of substituting the rashness of a licentious imagination, for the corrected and chaste effusion of true well-founded feeling and judgment. Unfortunately we have too frequent reason to regret, that a man may possess great vigour of fancy, unaccompanied by sound judgment; the want of the latter rendering abortive the vivacity and brilliancy of the former. There are none who are more in need of the corrective hand of a master, than a youth whose imagination outstrips his reason: and it not unfrequently occurs in the practice of the art, that the slow but steady growth of one endowed with a capacity little above the common standard, surpasses in the end the precocity of the former; who, indulging his imagination, plays with the store of knowledge early tuition has supplied, and forgets that the only mode of maintaining the fancy in full force, is by supplying it with new images; which perpetual recurrence to nature only can produce, and perpetual practice only can secure. "Invention," it has been said, "is not creation;" therefore to be a good and ingenious inventor in art, is not to run far into the riot of fancy, by the mere indulgence of it in wanton and monstrous devices; but rather to bring together such combinations of natural objects in their purest forms, as will best illustrate the subject adopted. This is its regulator in the higher class of pictures; in others of a lower order, and particularly what is called ornamental paintings, false and heterogeneous combinations, beginning at first in allegory, and afterwards continued, in spite of their acknowledged absurdity, merely on account of their beauty of form, allow of all the loose indulgence of the fancy which the most vivacious can desire.

When we consider the general extent of the gratification and information afforded by painting, it is extraordinary that a due attention to its principles is not yet admitted as a portion of polite education; since the knowledge of them so evidently increases the pleasure the art is capable of producing: the more particularly when, among the higher classes of mankind, it forms so very constant and material a source of their delights, and is so constantly also a subject of discussion, although arising from, and pretty generally decided by, sensation, rather than reason; and necessarily so indeed! "What can we reason, but from what we know?" Pope has justly said, and how can they decide with reason upon the merits of a work, who are ignorant of the principles upon which it is constructed? Yet so much of it is felt to be desirable, that every gentleman and lady conceives it necessary to learn to draw, regarding the art as worthy of a partial devotion of time: but this is generally effected in so inferior a degree, as to leave the polished learner utterly uninformed of its higher claims, its worthier objects, and its real utility.

To be truly a connoisseur or a judge of the qualities of painting when exercised in its highest style, notwithstanding the impertinent slipperiness of thousands of pretenders, requires a peculiar cultivation of mind; quite as much so as any other art or science requires an initiation into its principles, to be a judge of its effects. Our art,

however, appealing to the sense of sight, more than to reason, and producing its effects from the representation of well known objects, has a great advantage over others, in that its end is more easily comprehended, although the principles which govern its practice are not less abstruse and difficult of application. Most men, therefore, of good mental capacities, are capable of understanding and feeling the grand and general points; such as of colour, whether it be like that of natural objects, under peculiar circumstances; of expression, and if the story be fully and clearly exhibited; and of the general effect of the chiaro-scuro, whether it present an agreeable surface to the eye, &c.; but of the subtleties of arrangement and execution, whereby difficulties arising from the nature and disunion of the materials and parts are overcome; of the delicate hues, which are covertly introduced to produce harmony; and of the art which attaches light to light, and dark to dark, to produce masses, without violating the principles of nature: of these things, hidden as they are in the mystery of the art, none but an artist can well judge; though a portion of that knowledge may be acquired by scientific study without practice. No doubt a man being constantly or frequently in the habit of comparing picture with picture, and both with nature; and reflecting upon the diversities of each, their beauties, and their defects; may acquire a very considerable power of discrimination and judgment in matters of art; and more particularly if he devotes that time, which the regular artist is obliged to employ at his ease, to a careful investigation of nature, and the study of the means and principles of art. A man so tutored may become able to guide, in many points, the pencil of a good painter: still there are many others to which his attention can never be attracted, as they arise only from practice, and consequently can only be known and appreciated by those who are engaged in it. These, it may be remarked, must be of an inferior nature; and true it is they are so, in comparison with the great leading and essential features of a picture, whose subject is of a grand and heroic character; but nevertheless they enter into the aggregate, and assist in affording delight to that organ of sense through which the art appeals to the mind, and more readily enable it to attract attention.

This valuable art has, in the course of the world, been generally regarded as worthy of the greatest honours; and its eminent professors of a proportional share of estimation and rewards. Some of the greatest among men have, at different periods, upheld this opinion of its excellence, as its history testifies (see PAINTING); but Pericles, at the head of the Athenian republic, was the first who duly estimated its value as a national political instrument; and encouraging it, in conjunction with sculpture and architecture, laid, in part, the basis of the long continued fame of the city. He satisfied the people, who murmured at the expence he indulged in in the public works, that by advancing the interests of the arts, he was promoting their own glory. In tracing the mode in which they were employed, we discover the principles upon which they act; and which, being founded upon feelings and sentiments of the human heart, must always produce the same effect.

It is doubtless to the direction in which talent is employed, that we owe its utility, or its power to do mischief. The love of fame was the first object of the Greeks, and their leaders therefore very wisely employed every means to maintain so useful a spirit. In compliance with this, Panæus and Polygnotus were employed by Pericles to adorn the public buildings with paintings, the subjects of which were the heroic actions of the most renowned among their countrymen;

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trymen; thus perpetuating a record of those deeds which excited to emulation, which, appealing to the natural and instinctive pride of man, in a becoming manner, necessarily leads, wherever it is strongly felt, to great and useful conduct. There is no denying that painting is peculiarly adapted to this species of excitement, its effect being full and instantaneous; as the impression made upon the mind by witnessing the exhibition of a scene of heroism, of distress, or of delight, is greater than any which can arise from a detail of it in description. The interest in the relation is the weaker, as impression succeeds to impression; whereas in the fact, or the representation of it, the whole rushes upon the sight at once. But then it must be acknowledged, that there is this drawback in its effect upon the minds of men in general, that they are not prepared to comprehend more than the general impression; therefore the public works of the Greeks in painting, appear to have been conducted upon the most simple principles, in order that their whole object and intention might be universally embraced.

It is scarcely credible that, in direct opposition to this sentiment of the Greeks, any one should assert, in this enlightened period, that no inculcation of moral or religious truth can be effected by painting; the more so, when the works of Hogarth, the most instructive of painters, are in our hands, and no one who ever thinks of art at all can plead ignorance of them. An assertion to that effect has, however, lately been made by a very learned and ingenious author, in a critique on the life and works of J. Barry, esq. (see *Edinb. Review*, August 1810,) and he has gone the length of saying, "that as to conveying moral, religious, or political instruction in pictures, it is the most absurd of all absurd notions." If the ingenious gentleman means, by the word instruction, that kind only which properly belongs to painting, and to which, when speaking of the art, (if he mean well to its cause,) he ought to confine himself, *viz.* that sudden and unavoidable impressions of truth, which most men, not utterly destitute of sense, receive upon the first sight of a well regulated moral, or poetical composition; more particularly such as, being drawn from common nature, applies common objects to its purpose, and presents to the observer familiar incidents, surely every day's experience is against him. We would appeal to himself, if he has never received the impression of disgust at pride; abhorrence of avarice and of sensuality; disdain of vanity and idle waste of time, a prudential hint of the folly of extravagance, and of trusting to gay dissipation for the enjoyment of happiness; from the series of pictures called *The Marriage-a-la-mode* by Hogarth. What moral lectures in rhetoric would, or could, more completely illustrate, in a more universally intelligible manner, the fatal effects of vice, or the beneficial ones attendant upon virtue, than that ingenious painter has done in this, and others of his productions; as the industrious and idle apprentices, the Rake's and the Harlot's progress, &c. &c.; and yet with these designs in his hand, has he risked so unjust and ungenerous a sentiment as his assertion conveys. Ungenerous, because, if true, it can be productive of no good to extend such an opinion, and it tends to diminish the regard which painting has deservedly received from the world, wherever its highest powers have been engaged; and unjust, because it is contrary to the acknowledgment of ages, and is upheld by no reasoning at all applicable, and scarcely tangible; since, in support of it, he only inquires with a sneer, "what *argument* can be drawn in support of the idea of a future state, from Mr. Barry's picture of final retribution?" Does he not, in this, mistake the ground on which he ought to reason upon painting? If,

by argument, he means its usual acceptation, a deduction from point to point, till we arrive at a satisfactory definition of what is virtue and religion, or what is the probable nature of that future state of existence which man is destined to partake of: then we answer, that no *argument* in proof is expected from the art, none desired of it. The painter's business was to make that future state, the belief of which was already settled, as engaging as possible; to exemplify it in an attractive manner, and make beholders anxious to participate in its glory; and the enquiry ought to have been, has Mr. Barry effected that purpose? We do not hesitate to say, that in the point of invention he undoubtedly has. Who, beholding the assemblage of illustrious characters which he has introduced in that picture, upon a most judicious ground of reasoning, *viz.* their usefulness to mankind, is not led to serious reflection, and an ardent wish to unite with them, to be ranked with the great and good, and emulous to merit such exaltation; to share their conversation; to receive their instruction; and to adore in their enlightened society, that beneficent Creator whose incomprehensible greatness and goodness made and sustains the universe. Such was, such alone could be, the just object of the painter; and no attempt to prove the fact, whether this "corruptible shall put on incorruptible" or not; for that the Christian resorts to his Testament, and the heathen and the philosopher to nature. The artist can only exemplify it, and enlarge our consideration of that state wherein rational beings may be supposed to enjoy the highest possible degree of felicity; and in this respect Mr. Barry is borne out in the opinion he has endeavoured to illustrate, by the writings of many ingenious divines.

To say, what indeed is not said, but must almost necessarily be inferred, that no impression could be made upon the mind of an observer, favourable to virtue and religion by the contemplation of that picture, would be to say, that he either was incapable of reflection, or that by vice and sensuality he was become ill fitted to receive such impressions as it is calculated to produce upon well regulated minds; common experience is against it, and hundreds have left the room where it hangs with as serious and useful emotions, as a sermon on the subject would produce. Many have expressed these sentiments to the writer of this article; and he himself takes his opportunity of paying a grateful tribute of respect to the memory of Mr. Barry, whilst he acknowledges the lasting impression it made upon his mind, when he saw it in early life. Thus although the avowed truism, that virtuous conduct is the wisest and best that man can pursue for his own happiness, will find no *argument* in the pencil for its support; it will have a most able assistant, by the exhibition it is capable of affording of its effects. Is the moral or religious effect of painting, when duly appreciated and exercised, to be denied, when, as we have stated, such works as Hogarth's exist? and is that to take place first of all in the country where he was born, and exerted his useful talents?—He, whose pencil inculcates so powerfully the value of good, and the enormity of evil, and by the representation of the common events of life, brings home the sentiments of morality to every mind, and makes so forcible an appeal to the heart and head of every man possessed of ordinary understanding, be his state in life what it may; not, we will venture to say, to the exception of the learned author himself, whose ungentle sentiment towards the art is the cause of these remarks;—a sentiment whose object, or whose effect at least, if it have any, can only be to restrict the pencil from its most honourable and most valuable application; and render it a mere instrument of amusement, or of idle and useless gratification, or worse.

## PICTURE.

The appeal of the pencil is not so much to the understanding, as to the heart and mind; by that the first excitement is produced, and thence necessarily follow reflections, attached to the nature of the images presented to the eye. Do we not fearfully acknowledge its power to corrupt young minds, and take constant care to keep improper drawings from their view? What mode of information does it pursue in this case, but that of presenting images of agreeable views in an engaging manner? And is it allowed to be so sufficiently potent for the production of evil, that all our care is requisite to counteract or prevent its influence in that respect, and shall it be denied any influence in the promotion of good! forbid it reason, sense, and justice! If the objection to its utility be just, how shall we estimate the wisdom of those whom the learned author alluded to sufficiently honours on other occasions; of those who employed sculpture and painting as political and religious agents, to stimulate the ardent minds of the Greeks to heroism or devotion. The opinions of almost all ancient authors who have noticed it, are most decidedly in favour of the utility of the pencil; and those of the wisest politicians among the moderns have been amply illustrated by the use they have made of its powers.

If any thing can most effectively contribute to strengthen the disinclination of the government of our own country, towards the employment of painting in a way more worthy of its powers than portraiture, it is remarks of this nature, originating with men of acknowledged talent, of great acquirements, and partial devotion to the arts; and which, while they are so guarded as to be capable of justification in their author's peculiar view; yet leave an impression on the reader, much more widely effective in preventing or destroying the energies of the art, than he perhaps intended. But Dr. Johnson is reported to have said, that "he never could see any connection between the historical relation of a fact, and a picture of it;" and perhaps the author alluded to may have some similar diversity from the majority of mankind with regard to moral culture, which prevents him from regarding pictures in a moral or instructive point of view.

**PICTURE, *Pictura***, a piece of painting, or a subject represented in colours, on canvas, wood, or the like; and inclosed in a frame.

Pictures or paintings in oil are preserved by coating them with some transparent and hard substance, as a varnish, in order to secure the colours from the injuries of the air or moisture; and to defend the surfaces from scratches or any damages the painting might receive from slight violence. The substances that have been, or may be used for this purpose, are gum arabic, dissolved in water, with the addition of sugar or sugar-candy, to prevent its cracking; glair or whites of eggs, mixed with a little brandy or spirit of wine, in order to make it work more freely, and a lump of sugar to prevent its cracking; isinglass-size, used as either of the former, or mixed with a fourth or fifth of its weight of honey or sugar, and varnishes formed of gum resins dissolved in spirit of wine, or oil of turpentine, which last are called oil-varnishes.

Paintings in miniature are preserved by plates of glass, or the tale called isinglass, placed before them in the frame. Paintings in distemper may be rendered more durable, and preserved from foulness by varnishing them with hot size, boiled to a strong consistence, in which a fifteenth or twentieth part of honey has been dissolved. Crayons must be preserved in the same manner with paintings in water colours, by plates of glass or isinglass.

When pictures are cut or torn, they may be repaired by

laying them on an even board or table, carefully putting together the torn or divided parts with colour laid as a cement, in and over the joint, and keeping them in the situation till the cement is thoroughly dried. The protuberance of the cement may be easily reduced with a penknife, and the repaired part properly coloured so as to correspond with the picture. When part of the cloth is destroyed, a piece of canvas somewhat bigger than the vacant space is to be plattered over on the outside of the cloth with white or any other colour, and when it is thoroughly dry, the inequality of the picture in this part is to be filled up with the same matter, and properly reduced and coloured.

The art of cleaning pictures and paintings is of great consequence in order to their preservation: in this operation great skill and care are requisite, so that the menstruum used for taking off any foulness may not dissolve the oil in the painting itself, or disorder its colours, and that each sort of varnish with which paintings are coloured may be taken off without injury to the painting. The first and most general substance used for cleaning pictures is water, which will remove any foulness arising from many kinds of glutinous bodies, as sugar, honey, glue, &c. and any varnish of gum arabic, glair of eggs or isinglass, without affecting the oil that holds the colours together. Olive oil or butter will dissolve pitch, resin, and other substances of a like kind, without injuring the oil of the painting. Pearl-ashes, dissolved in water, form a proper menstruum for most kinds of matter that foul paintings; but they must be very cautiously used, as they will corrode the oil of the painting, if there be no varnish of the gum resins over it. Soap is of the same nature, and should be cautiously applied, and only to particular spots, that elude all other methods. Spirit of wine will dissolve all the gums and gum resins, except gum arabic, and is therefore very necessary for taking off from pictures varnishes composed of such substances, but it also corrodes the oil of the painting. This is also the case with oil of turpentine, and essence of lemon, spirit of lavender, and rosemary, and other essential oils. With regard to paintings that are varnished with gum arabic, glair of eggs, or isinglass, the varnish should be taken off when they are to be cleaned. This may be easily distinguished by wetting any part of the painting, which will feel clammy, if varnished with any substance soluble in water. This kind of varnish may be taken off with hot water and a sponge, or by gentle rubbing with a linen cloth dipped in warm water. If paintings, on this trial, appear to be varnished with gum resins, or such substances as cannot be dissolved in water, they may, in some cases, be sufficiently cleaned by a sponge with warm water; and any remaining foulness may be removed by rubbing the painting over with olive oil made warm, or with butter, which should be wiped off with a woollen cloth; and if the picture require farther cleaning, wood-ashes or pearl-ashes may be used in the following manner: take an ounce of pearl-ashes, and dissolve them in a pint of water; or take two pounds of wood-ashes, and stir them well in three quarts of water, once or twice in an hour for half a day. Then pour off the clear fluid, and evaporate it to a quart or three pints; wash the painting well with a sponge dipped in either of these leys, and rub gently any foul spots with a linen cloth till they disappear. If this method fail, recourse must be had first to spirit of wine, then to oil of turpentine, and if these are ineffectual, the essence of lemons; with either of which the foul spots should be slightly moistened, and the part immediately rubbed gently with a linen cloth. After a little rubbing, if oil of turpentine or essence of lemon has been applied, olive oil should be put upon the spot;

spot; and water, if spirit of wine has been used; which should be taken off with a woollen cloth; repeating the operation till the foulness be removed. When paintings appear to have been varnished with those substances that will not dissolve in water, and after the use of the above means retain their foulness, the following method will succeed: place the picture or painting in a horizontal situation; and moisten, or rather flood, by means of a sponge, the surface with very strong rectified spirit of wine: keep the painting thus moistened, by adding fresh quantities of the spirit, for some minutes; then flood the whole surface copiously with cold water; wash off the whole without rubbing; and when the painting is dry, repeat the operation till the whole varnish is taken off. Handm. to the Arts, vol. i. p. 224. 245.

PICTURES, or *Paintings, in Oil, Method of taking off, &c.* The art of removing paintings in oil, from the cloth or wood on which they are originally done, and transferring them to new grounds of either kinds of substance, is of great use. For those on cloth or canvas, the method is as follows: let the decayed picture be cleansed of all grease that may be on its surface, by rubbing it very gently with crumb of stale bread, and then wiping it with a very fine soft linen cloth. It must then be laid, with the face downwards, on a smooth table covered with fan-paper, or the India-paper; and the cloth on the reverse must be well soaked with boiling water, spread upon it with a sponge, till it appears perfectly soft and pliable. Turn the picture with the face upwards, and having stretched it evenly on the table, pin it down with nails at the edges. Having melted a quantity of glue and strained it through a flannel cloth, spread part of it, when a little stiffened, on a linen cloth of the size of the painting, and when this is set and dry, lay another coat over it; when this becomes stiff, spread some of the glue, moderately heated, over the face of the picture, and lay over it the linen cloth already prepared in the most even manner, and nail it down to the picture and table. Then expose the whole apparatus to the heat of the sun, in a place where it may be secured from rain, till the glue be perfectly dry and hard; when this is the case, remove the picture and linen cloth from the table. Turn the picture with the face downwards, and let it be stretched and nailed to the table as before; then raise round its edge a border of wax, as in the etching of copper-plates, forming a kind of shallow trough with the surface of the picture; into which pour a proper corroding fluid, as oil of vitriol, aqua fortis, or spirit of salt, but the last is to be preferred: dilute either of these with water to such a degree, determined by previous trials, that they may destroy the threads of the original canvas or cloth of the picture, without discolouring it. When the corroding fluid has answered this purpose, drain it off through a passage made at one end of the border of wax, and wash away the remaining part by repeatedly pouring quantities of fresh water on the cloth. The threads of the cloth must be then carefully picked out till the whole be taken away. The reverse surface of the painting, being thus wholly freed from the old cloth, must be well washed with water by means of a sponge, and left to dry. In the mean time prepare a new piece of canvas of the size of the painting; and having spread some hot glue, purified as before, and melted with a little brandy or spirit of wine over the reverse of the painting, lay the new canvas evenly upon it while the glue is hot, and compress them together with thick plates of lead or flat pieces of polished marble. When the glue is set, remove these weights, let the cloth remain till the glue is become perfectly dry and hard. Then the whole must be again turned with the other side upwards, and the border of wax being

replaced, the linen cloth on the face of the painting must be destroyed by means of the corroding fluid; particular care is necessary in this part of the operation; because the face of the painting is defended only by the coat of glue which cemented the linen cloth to it. The painting must then be freed from the glue by washing it with hot water, spread and rubbed on the surface by a sponge. The painting may afterwards be varnished as a new picture; and if the operation be well conducted, it will be transferred to the new cloth in a perfect state.

When the painting is originally on wood, it must first be detached from the ceiling or wainscot where it was fixed; and the surface of it covered with a linen cloth, cemented to it by means of glue, as already directed. A proper table being then provided, and overspread with a blanket, or thinner woollen cloth, laid on in several doubles; the painting must be laid upon it with the face downwards, and fixed steady; and the board or wood on which it was done must be planed away, till the shell remains as thin as it can be made, without damaging the paint under it. The process is afterwards the same as that in the case of paintings on canvas, till the painting on wood be in like manner transferred to a cloth or canvas. Doffie's Handm. to the Arts, vol. ii. p. 417, &c.

PICTURE, *Magical.* See MAGICAL.

PICTURESQUE BEAUTY, according to a late elegant writer, refers to "such beautiful objects as are suited to the pencil." This epithet is chiefly applied to the works of nature, though it will often apply to works of art also. Those objects are most properly denominated picturesque, which are disposed by the hand of nature with a mixture of *varied rudeness, simplicity, and grandeur.* A plain neat garden with little variation in its plan, and no striking grandeur in its position, displays too much of art, design, and uniformity, to be called picturesque. "The idea of *neat and smooth* (says Mr. Gilpin), instead of being picturesque, in fact disqualify the object in which they reside from any pretensions to picturesque beauty. Nay, farther, we do not scruple to assert, that roughness forms the most essential point of difference between the beautiful and the picturesque; as it seems to be that particular quality which makes objects chiefly pleasing in painting. I use the general term *roughness*; but, properly speaking, roughness relates only to the surfaces of bodies: when we speak of their delineation, we use the word *ruggedness*. Both ideas, however, equally enter into the picturesque, and both are observable in the smaller as well as in the larger parts of nature; in the outline and bark of a tree, as in the rude summits and craggy sides of a mountain.

"Let us then examine our theory by an appeal to experience, and try how far these qualities enter into the idea of picturesque beauty, and how far they mark that difference among objects which is the ground of our inquiry.

"A piece of Palladian architecture may be elegant in the last degree; the proportion of its parts, the propriety of its ornaments, and the symmetry of the whole, may be highly pleasing; but if we introduce it in a picture, it immediately becomes a formal object, and ceases to please. Should we wish to give it picturesque beauty, we must use the mallet instead of the chisel; we must beat down one-half of it, deface the other, and throw the mutilated members around in heaps; in short, from a smooth building we must turn it into a rough ruin. No painter who had the choice of the two objects would hesitate a moment.

"Again, why does an elegant piece of garden-ground make no figure on canvas? The shape is pleasing, the combination of the objects harmonious, and the winding of the  
walk

walk in the very line of beauty. All this is true; but the smoothness of the whole, though right and as it should be in nature, offends in picture. Turn the lawn into a piece of broken ground, plant rugged oaks instead of flowering shrubs, break the edges of the walk, give it the rudeness of a road, mark it with wheel tracks, and scatter around a few stones and brushwood: in a word, instead of making the whole smooth, make it rough, and you make it also picturesque. All the other ingredients of beauty it already possessed." On the whole, picturesque composition consists in uniting in one whole, a variety of parts, and these parts can only be obtained from rough objects.

It is possible, therefore, to find picturesque objects among works of art, and it is possible to make objects so; but the grand scene of picturesque beauty is nature in all its original variety, and in all its irregular grandeur. "We seek it (says our author) among all the ingredients of landscape, trees, rocks, broken grounds, woods, rivers, lakes, plains, valleys, mountains, and distances. These objects in themselves produce infinite variety; no two rocks or trees are exactly the same; they are varied a second time by combination; and almost as much a third time by different lights and shades and other aerial effects. Sometimes we find among them the exhibition of a whole, but oftener we find only beautiful parts."

Sublimity or grandeur alone cannot make an object picturesque: for, as our author remarks, "however grand the mountain or the rock may be, it has no claim to this epithet, unless its form, its colour, or its accompaniments, have some degree of beauty. Nothing can be more sublime than the ocean; but wholly unaccompanied, it has little of the picturesque. When we talk, therefore, of a sublime object, we always understand that it is also beautiful; and we call it sublime or beautiful only as the ideas of sublimity or simple beauty prevail. But it is not only the form and the composition of the objects of landscape which the picturesque eye examines, it connects them with the atmosphere, and seeks for all those various effects which are produced from that vast and wonderful storehouse of nature. Nor is there in travelling a greater pleasure than when a scene of grandeur bursts unexpectedly upon the eye, accompanied with some accidental circumstance of the atmosphere which harmonizes with it, and gives it double value."

There are few places so barren as to afford no picturesque scene.

"————— Believe the muse,  
She does not know that inauspicious spot  
Where beauty is thus niggard of her store.  
Believe the muse, through this terrestrial waste  
The seeds of grace are sown, profusely sown,  
Even where we least may hope."

Mr. Gilpin mentions the great military road between Newcastle and Carlisle as the most barren tract of country in England; and yet there, he says, there is "always something to amuse the eye. The interchangeable patches of heath and green-ward make an agreeable variety. Often, too, on these vast tracts of intersecting grounds we see beautiful lights, softening off along the sides of hills; and often we see them adorned with cattle, flocks of sheep, heath-cocks, grouse, plover, and flights of other wild-fowl. A group of cattle standing in the shade on the edge of a dark hill, and relieved by a lighter distance beyond them, will often make a complete picture without any other accompaniment. In many other situations also we find them wonderfully pleasing, and capable of making pictures amidst all the deficiencies of land-

scape. Even a winding road itself is an object of beauty; while the richness of the heath on each side, with the little hillocks and crumbling earth, give many an excellent lesson for a fore-ground. When we have no opportunity of examining the grand scenery of nature, we have every where at least the means of observing with what a multiplicity of parts, and yet with what general simplicity, she covers every surface.

"But if we let the imagination loose, even scenes like these administer great amusement. The imagination can plant hills; can form rivers and lakes in valleys; can build castles and abbeys; and if it find no other amusement, can dilate itself in vast ideas of space."

Mr. Gilpin, after describing such objects as may be called picturesque, proceeds to consider their sources of amusement. We cannot follow our ingenious author through the whole of this consideration, and shall therefore finish our article with a short quotation from the beginning of it. "We might begin," says he, "in moral style, and consider the objects of nature in a higher light than merely as amusement. We might observe, that a search after beauty should naturally lead the mind to the great origin of all beauty; to the

"———— first good, first perfect, and first fair."

But though in the theory this seems a natural climax, we insist the less upon it, as in fact we have scarce ground to hope that every admirer of picturesque beauty is an admirer also of the beauty of virtue, and that every lover of nature reflects, that

"Nature is but a name for an *effeū*,  
Whose *cause* is God."

If, however, the admirer of nature can turn his amusements to a higher purpose; if its great scenes can inspire him with religious awe, or its tranquil scenes with that complacency of mind which is so nearly allied to benevolence, it is certainly the better. "Apponatur luero." It is so much into the bargain; for we dare not promise him more from picturesque travel than a rational and agreeable amusement. Yet even this may be of some use in an age teeming with licentious pleasure; and may in this light at least be considered as having a moral tendency."

PICUCULI *de Cayenne*, in *Ornithology*. See GRACULA *Cayennensis*.

PICUIPINIMA. See COLUMBA *Passerina*.

PICUS, in *Ornithology*, a genus of birds of the order Picæ; the generic character is as follows: bill angular, straight, wedged at the tip; nostrils covered with recumbent straceous feathers; tongue round, worm-shaped, very long, bony, missile, daggered, beset at the point with bristles bent back; it has ten tail-feathers, which are hard, rigid, and pointed; the feet are formed for climbing. The birds of this genus live principally upon insects, to obtain which they climb trees, and are perpetually in search of those crevices in which their food is lodged. These insects they transfix with their missile and daggered tongue, which, when it has obtained its purpose, is, by an almost invisible motion, withdrawn wholly into the mouth. This process is almost incessantly repeated throughout the whole day, with the utmost precision and celerity. Doomed to this perpetual occupation, wood-peckers avoid society, even that of their own species, and appear to possess none of the animation of cheerfulness, or vigour of courage. They have no notes but such as are expressive of pain and fadness, and they seem to lead a life of labour and restlessness. There are nearly sixty species mentioned in Gmelin's last edition of *Linnaeus*.

# PICUS.

## Species.

\* **MARTIUS**, or Great black Wood-pecker. The specific character is black; cap vermilion. This bird inhabits many parts of Europe, as well as our own country; it is also a native in Siberia and Chili; it is found chiefly in the poplar tree; it builds a large deep nest, and lays two or three eggs; it feeds principally on bees and ants, and is about seventeen or eighteen inches long. This bird speedily excavates trees, so as to expose them to be blown down by winds which would not otherwise have affected them. Under the hole made by it, saw-dust and pieces of wood may sometimes be found in pecks.

**LIGNARIUS**; White-bellied Wood-pecker. Cap vermilion; body barred with white. This is found chiefly in Chili, and is somewhat less than a blackbird.

**PRINCIPALIS**; White-billed Wood-pecker. Black; crest scarlet; a line on each side the neck and secondary quill-feathers is white. It inhabits America, from New Jersey to Brazil; is about sixteen inches long, and makes spiral holes in the trees.

**PILEATUS**; Pileated Wood-pecker. Black; crest red, temples and wings spotted with white. It inhabits the woods of North America, and is eighteen inches long; the female of this species has a brown front. There is a variety of which the belly is obscurely barred with white.

**LINEATUS**; Lincated Wood-pecker. This species is black; crest is scarlet; it has a white line from the bill down the neck, and as far as the middle of the back. It inhabits Cayenne, as does the next, and is nearly fourteen inches long.

**RUBRICOLLIS**; Red-necked Wood-pecker. Brown, beneath tawny; crested head and neck blood-red.

**MELANOLEUCOS**; Buff-crested Wood-pecker. Black; body beneath, line on each side the neck, nape and rump white; the hind part of the crest brownish-yellow. It is found in Surinam.

**HIRUNDINACEUS**; Lesser black Wood-pecker. Black; cap scarlet; shoulders dotted with white. It inhabits North America, and is about five inches and a half long. Two varieties of this species inhabit Cayenne. 1. Middle of the breast red; belly varied with black and grey. 2. Crown with a red spot; area of the eyes is white; the hind-head is golden. Of this last variety the whole head of the female is black; the eye-lids are white.

**PASSERINUS**; Passerine Wood-pecker. Yellowish-olive, beneath barred with brown and whitish; is about six inches long, and is found in St. Domingo.

**STRIATUS**; Rayed Wood-pecker. Black streaked with olive, beneath olive; front, cheeks, chin, throat, and breast grey; crown, hind-head, rump, and upper tail-coverts red. There is a variety that has a black crown; it is nine inches long, and is found in St. Domingo.

**MELANOCILOROS**; Gold-crested Wood-pecker. Variegated with black and yellow; the crest is gold; tail is black. It inhabits Cayenne, and is about thirteen inches long. There is a variety that has a black crown; a red crest; the middle tail-feathers are black, the lateral ones are barred with tawny and black.

**FLAVESCENS**; Yellow-crested Wood-pecker. Black barred with yellow; pendent crest, chin, cheeks, and neck yellow. It is found in Brazil, and is about the size of a jay.

**CAYANENSIS**. This, as its name imports, is found in Cayenne, and is not quite eight inches long. It is olive-coloured; the feathers towards the tip are marked with a

black spot; the crown, chin, and tail are black; the hind-head is red; the cheeks are whitish; the belly is yellowish.

**FLAVICANS**; Yellow Wood-pecker. Yellowish, crested; quill-feathers brown; tail black. It inhabits Cayenne, as do the next two. The male bird has a maxillary band.

**CINNAMOMEUS**; Ferruginous Wood-pecker. Cinnamon colour, with a few yellowish spots; the crest and lower part of the back yellow; the tail is black.

**MULTICOLOR**; Black-breasted Wood-pecker. This species is crested; rufous; beneath pale rusty; head, chin, and neck orange; nape, throat, breast, and spots on the wings black.

**ERYTHROCEPHALUS**; Red-headed Wood-pecker. Head wholly red; wings and tail black; the belly is white. It is found in North America, and is nine inches and a half long; it migrates and feeds on acorns, fruit, and Indian corn. From the visits of this bird, the natives are enabled in a measure to foretell the rigour or clemency of the approaching winter. This species is extremely destructive to maize fields and orchards. During winter they are very tame, and sometimes come into houses, as the robin does with us. They are found chiefly in old trees, and the noise which they make with their bills, may, when the air is calm and still, be heard at the distance of a mile and more.

**RUBER**; the Red-breasted Wood-pecker. Head, neck, and breast red; back and wings black; belly ochre. It is found at Cayenne.

**OBSCURUS**; White-rumped Wood-pecker. Dusky, streaked and waved with whitish; beneath it is white; first quill-feathers black, secondary white, with two black bars. It inhabits Long island, and is nine inches long.

**FASCIATUS**; Striped-bellied Wood-pecker. The colour of this species is black; the crown, lores, and sub-maxillary band are scarlet; the belly is streaked white and black; tail-feathers white at the tip.

**AURANTIUS**; Orange Wood-pecker. Above orange; nape, rump, and tail black; is about ten inches long, and is found at the Cape of Good Hope.

**SENEGALENSIS**; Gold-backed Wood-pecker. Front and cheeks are brown; cap red; back and quill-feathers reddish-gold; body beneath grey, undulate with brown and white. It is found in Senegal, and is scarcely larger than a sparrow.

**CAPENSIS**; Cape Wood-pecker. This, as its name signifies, is found in the Cape of Good Hope, and is less than our lark; it is grey; the back, neck, and breast are olive; the quill-feathers are dusky; rump and upper tail-coverts red; tail-feathers black. There is a variety that has its back and wings olive-brown; cap, rump, and belly red.

**AURATUS**; Gold-winged Wood-pecker. Striated transversely with black and grey; the chin and breast black; the nape is red, and the rump is white. It is found in North America, and is almost continually on the ground; it feeds on worms and insects, and when these are not to be had, on berries and grubs. When fat it is esteemed excellent food. It migrates to Hudson's Bay, and it does not climb trees.

**CAPER**; Gold-winged Wood-pecker. Above brown, beneath claret, dotted with black; wings beneath, and shafts of the wings and tail, vermilion. It is found at the Cape of Good Hope.

**OLIVACEUS**; Crimson-breasted Wood-pecker. This species is olive; neck beneath, breast and rump pale red; chin, throat, quill-feathers and vent dusky brown; the tail above is black.

**CAROLINUS**; Carolina Wood-pecker. Cap and nape red; back with black bands; middle tail-feathers white, dotted

## PICUS.

dotted with black, the rest black. There are three varieties of this species. 1. Front and cheeks pale brown; belly pale yellowish-brown. 2. Spots on the chin and under the eyes red. 3. Black and white; cap, nape, and belly red; front and neck beneath yellow-grey; sides of the neck from the mouth with a black line.

**UNDATUS**; Red-cheeked Wood-pecker. Testaceous waved with black; temples blood-red. It inhabits Guiana and Surinam, as do the two following.

**RUFUS**; Rufous Wood-pecker. Rufous waved with black; wings, tail, and body beneath deeper. A variety has a black breast; and under the eyes a black spot.

**CHLOROCEPHALUS**; Yellow-headed Wood-pecker. Olive, beneath spotted with white; neck and subcrested head yellow; crown red. This is six inches long.

**MINIATUS**; Red-winged Wood-pecker. Crested, red, beneath white; throat rosy; bill and tail blue; tail-coverts green. This is nine inches long, and is found in Java.

**MALACCENSIS**; Malacca Wood-pecker. Crested head and shoulders scarlet; chin and throat rufous yellow; body beneath barred with black and white; the tail is black. It is found in Malacca, as its name imports.

**PITIU**. Brown dotted with white; the tail is short. It inhabits Chili; has the appearance of a pigeon, and builds, not in the hollows of trees, but on the banks of rivers and declivities of mountains; it lays usually four eggs.

\* **VIRIDIS**; Green Wood-pecker. Green; crown crimson. This is the largest species found in England, and is full thirteen inches long. These birds are frequently seen on the ground, particularly where ant-hills abound, the population of which they extirpate by their incessant efforts. This bird will occasionally not be contented with darting its tongue at them singly, but by the combined exertion of its bill and feet lays open the whole nest, and commits the most wholesale ravage upon the ants and their eggs. There is a variety found in Mexico, full thirteen inches long; of which the upper part of the head and spots beneath the ears are deep red; the rump is of a pale yellow. It makes a circular hole in the dead part of trees for its nest, and lays five or six greenish coloured eggs spotted with black; it is remarkably fond of bees.

**BENGALENSIS**; Bengal Wood-pecker. Green; crest red; nape black; front and throat variegated white and black; body beneath white. It is eight inches and a half long, and is found in Bengal. A variety of this species is a little larger, and inhabits Ceylon and China. Its head is marked with numerous white spots; the back is black, and scarlet in the middle.

**QUADRIMACULATUS**; Blue-throated Wood-pecker. Green; beneath blueish; crown and rump yellow; throat, quill and tail-feathers black. This is the size of the *Viridis*, and is found in Ceylon.

**PHILIPPINARUM**; Philippine Wood-pecker. The size of the last, and found in Manila. It is brown-green; crested; beneath spotted with white and black; the rump is red; the tail-feathers have two white spots.

**GOENSIS**; Goa Wood-pecker. Green, beneath whitish; crown and crested hind-head red; tail and fillet reaching from the eyes to the wings black; the wings are golden. It is found in Goa, and is very similar to the *Bengalensis*.

**MANILLENSIS**; Manila green Wood-pecker. Dirty-green; crown covered with grey; wings and tail blackish; upper tail-coverts red. It is found in Manila.

**GARTAN**; Crimson-rumped Wood-pecker. Above grey-brown, beneath yellowish-grey; wings with dirty spots; crown and rump red. It is found in Senegal, and is a good deal less than the *Viridis*.

**CANUS**; Grey-headed green Wood-pecker. Cinereous,

front obscurely spotted with red; back, shoulders, wing and tail-coverts green; rump yellow; wings and tail brown; chin whitish. It inhabits Norway, Russia, and Siberia.

**PERSICUS**; Persian Wood-pecker. Pale yellow; body above, tips of the quill-feathers, and area of the eyes, ferruginous. It is a native of Persia.

**SEMIROSTRIS**; Half-billed Wood-pecker. Brown-ash, beneath white; head brown, spotted with yellowish; upper mandible shorter. It is only of the size of a martin.

**PUBESCENS**; Downy Wood-pecker. Back longitudinally downy; outer tail-feathers white, with four black spots. The male bird has the hind-head red. It is found in Carolina, Virginia, and other parts of North America, and is a very daring bird, and particularly mischievous to fruit-trees in orchards. As soon as it has pecked one hole in a tree, it makes another close to the first, in a horizontal direction, proceeding till it has made a circle of holes quite round the trunk, so that the tree frequently dries up and decays.

**VILLOSUS**; Hairy Wood-pecker. Back somewhat downy, in a longitudinal direction; the outer tail-feathers are entirely white. It is from nine to twelve inches long. Like the *Pubescens*, it is a sad pest to orchards. It inhabits North America, from Hudson's Bay to Carolina, and it has been seen in the north of England.

\* **MAJOR**; Greater spotted Wood-pecker. Variegated with black and white; the vent and hind-head are red. This is also called the witwall, is nine inches long, and strikes with far greater comparative force against the trees than any of the tribe. It creeps with facility over the branches in every direction; and when any person attempts to observe it on one side of a branch, it passes to the opposite with extreme celerity, repeating this change in correspondence with every renewed effort of the enemy. It inhabits many parts of Europe, as well as England; here indeed it is less frequent than the *Viridis*, to which it is closely allied in manners and habits, except that it rarely descends to the ground in search of food. It lays four or five glossy eggs in the decayed wood, without any formal preparation of a nest.

\* **MEDIUS**; Middle spotted Wood-pecker. Variegated with white and black, the vent and cap are red. It is doubted if this be a distinct species, or whether it be not the young of the *Major* just described.

\* **MINOR**; Lesser spotted Wood-pecker. This species is also variegated with white and black; the crown is red, and the vent testaceous. It is found in divers parts of Europe and Asia. It has the habits of the *Major*, but is much more rarely seen. There are two varieties; 1. Crown, nape and scrag black-grey; body beneath yellowish, spotted with black. This is a native of Panay. 2. Hind-head subcrested; crown with a crimson spot; front, cheeks, and body beneath white. It is found in Ceylon.

**TRICOLOR**; Varied Wood-pecker. Black, with white transverse streaks; breast and belly red. It inhabits New Spain.

**CANADENSIS**; Canada spotted Wood-pecker. White; crown, back, shoulders, and the two middle tail-feathers black, the other tail-feathers and wings varied with black and white. It is a native of Canada, and nine inches long.

**VARIUS**; Yellow-bellied Wood-pecker. Variegated black and white; crown red; vent white, barred with brown. It inhabits North America; nine inches long; it is a very numerous tribe, and extremely destructive to corn and fruits.

**FLAVIPES**; Yellow-legged Wood-pecker. Black, beneath white; legs yellow.

**BICOLOR**; the Encenada Wood-pecker. Varied with

grey and white; sides of the crested head white; quill-feathers brown, spotted with white. The female bird is totally brown, with a crest.

**CARDINALIS**; *Cardinalis* Wood-pecker. Black, beneath white, spotted with black; the crown and hind-head red. Found in Luzonia; and is the size of the *Viridis*.

**NUBICUS**; Nubian Wood-pecker. Variegated with white, rufous, and brown; crown black, spotted with white; hind-head subcrested; red breast, whitish, with black dots; tail with rufous brown lines. It is found in Nubia, and is seven inches and a half long.

**MOLUCCENSIS**; Brown Wood-pecker. Black, waved with white; beneath whitish, arrow-streaked with brown; quill and tail-feathers brown, spotted with white. It inhabits the Molucca islands. There is a variety black-brown, spotted with white; beneath and head white; crown and spot beneath the eyes brown. It inhabits India, and is five inches long.

**MINUTUS**; Minute Wood-pecker. This, the least of all the tribe, is found in Cayenne. It is chestnut-grey; beneath whitish waved with brown; crown red; hind-head black, spotted with white.

**TRIDACTYLUS**; Three-toed Wood-pecker. Variegated black and white; three-toed; a variety is also variegated black and white; and white beneath. The *first* inhabits America, Europe, and Sicily: the *second* is found in Cayenne.

**PICUS Cinereus**. See *SITTA Europæa*, *S. jamaicensis*, and *S. major*.

**Picus Imbricatus**, or *Picus Principalis* of Linnæus, the name of an American bird, described by Nieremberg, and called by the natives *quatotomini*. It is of the size of the hoopoe, and is variegated with black and brown; it is of the wood-pecker kind, having a beak three fingers breadth long, with which it perforates trees: its head is small and red, and has a fine red crest; but the feathers are black on their upper side; it has on each side of the neck a broad white line, reaching to the breast; its legs and feet are of a bluish colour; it builds in high trees, and is principally found near the shores of the South sea. It feeds on insects. See **PICUS**.

**Picus Major Leucophaeus**. See **CUCULUS Vetula**.

**Picus Murarius**, the name of a bird called in English the *wall-creeper*, and improperly ranked among the *pici*, as wanting many of the characters of that genus: and therefore classed in the Linnæan system under the genus of *certhia*, or creeper. It is about the bigness of the common sparrow; its bill is black, slender, and long; its head, neck, and back grey; its breast white, and its wings partly grey and partly red; its tail is short and black; its long wing-feathers also, and the lower part of its belly, and its legs, are of the same colour; its legs are short, but its feet are not placed as in the wood-pecker; but are three before and one behind; it is very common in Italy, Germany, and some parts of France; it is a very lively and cheerful bird, and as the common wood-pecker climbs trees and feeds on the insects in their cracks, so this bird runs up old walls, and feeds on what it finds in the cracks of the stones.

**Picus Nidum Suspendens**, a name by which some authors have called the galbula; a yellow bird of the thrush kind, very remarkable for its beauty, and for the structure and manner of hanging its nest. See **ORIOLES Galbula**.

**Picus Salutiferus**, the name under which Nieremberg has described a Mexican bird, called by the natives *henqueholtototl*.

It is of the size of the common black-bird, and has a long and black beak: its head and a great part of its neck

are red; its breast and belly are grey, and it has a crest of red feathers upon its head. It is of the wood-pecker kind, and has its name from the supposed virtue of its feathers, particularly those of the crest, in curing the head-ach.

**PIDAÛRA**, in *Geography*, a town of the Morea, anciently called "Epidaurus," situated on the W. coast of the gulf of Engia; 35 miles E. of Napoli di Romania. N. lat. 37° 40'. E. long. 23° 24'.

**PIDISJARVI**, a town of Sweden, in the government of Ulea; 48 miles E. of Gamla Karleby.

**PIE**, in *Agriculture*, a provincial term applied to signify a receptacle for preserving potatoæ, turnips, and other roots. And when these are for potatoes they are usually formed with dry earth in a dry situation, being made in the ridge or conical form.

Pies are likewise made use of for curing rape-seed, being built in the field with platted straw. The form, according to Mr. Marshall, is that of a corn bushel, the diameter seven or eight feet, the height three or four feet. This large straw basket-like receptacle is filled with rough feed to the brim, topped up in a conical form with straw, and the whole secured with a coat of thatch. This is mostly done when the markets are bad at the period of thrashing, as the feed may be preserved any length of time in these pies, if there is a sufficiency of pulls among it, and the quantity of feed deposited in them be not too large. It is at present a practice seldom employed.

**PIECE**, in *Commerce*, signifies sometimes a whole, and sometimes only a part of the whole.

In the first sense we say, a piece of cloth, of velvet, &c. meaning a certain quantity of yards, regulated by custom, being yet entire, and not cut.

In the other signification we say, a piece of tapestry; meaning a distinct member wrought apart, which, with several others, make one hanging.

A piece of wine, of cyder, &c. is a cask full of those liquors.

**PIECE, Chimney**. See **CHIMNEY**.

**PIECE, Detached**. See **DETACHED**.

**PIECE, Easel**. See **EASEL**.

**PIECE-Goods**, in *Commerce*, a name given in India to the various fabrics of manufactured cotton.

**PIECE, Master**. See **MASTER**.

**PIECE**, in *Coinage* and *Commerce*, signifies sometimes the same thing with *species*: as when we say this piece is too light, &c.

Sometimes, by adding the value of the pieces, it is used to express such as have no other particular name: as a piece of eight rials, a piece of twenty-five sols, &c.

In England, the piece, absolutely, is sometimes used for twenty shillings sterling, and sometimes for a guinea.

By 6 Geo. II. cap. 25. broad-pieces, of five-and-twenty, or three-and-twenty shillings value, or any halves or quarters thereof, are called m. And all persons are forbid to receive or utter them in payment by tale.

**PIECE of Eight** denotes the Spanish dollar or peso, which in foreign exchanges is valued at 8 reals of old plate or 15 reals 2 maravedis vellon: but in commercial transactions within the country, it is reckoned at 15 reals vellon.

As a silver coin, the dollar, or peso duro, since the coinage of 1772, passes for 20 reals vellon, and the half dollar, or pseudo vellon, for 10. This dollar contains 374½ troy grains of fine silver, or 405½ grains of English standard silver; and therefore its value in English silver coin is 4s. 4½d.; and the half dollar in proportion. The value of the peso of plate, or dollar of exchange, in English silver coin, is 39½d.; but if allowance be made for remedy in coinage, it must be valued in the dollar at ½ sterling. By the assay

affay at the London mint, the weight of the dollar is 17 dwt. 8 gr., and its fineness 8 dwt. worse than English standard: hence its value in English silver coin is 4s. 3 $\frac{3}{4}$ d.

The average weight of 1000 dollars at the Bank of England is found to be 866 ounces troy.

The Spanish dollars coined since 1772 have the following impressions: head of the reigning king, with his name and *DEI GRATIA*; reverse, arms of Spain; which, on pieces coined at Mexico, stand between two pillars with *NE PLUS ULTRA*: legend round the piece, *HISPAN. ET IND. REX*, with an M. for Mexico; 8 R. for eight reals, and the initials of the moneyer's name: these are commonly called Pillar dollars; but those coined in Europe have no pillars; and the legend is only, *HISPANIARUM REX*. The initials are not at the end of the legend, but by the side of the effigie in place of the pillars. The divisions of the dollar bear the same impressions; but the half dollar is marked 4 R.

In the Danish islands, St. Thomas, St. John, and Santa Cruz, accounts are kept in pialtres or rix-dollars current (also called pieces of eight), each rix-dollar being divided into eight schillings or bits, and each bit into six stivers. Accounts are also kept in dollars of 100 cents, as in America. The Spanish dollar passes here for 12 $\frac{1}{2}$  bits, and each bit for 6 $\frac{3}{4}$  stivers. Kelly's Universal Cambist. See *COIN* and *EXCHANGE*.

PIECE is also a kind of money of account, or rather a manner of accounting, used among the negroes on the coast of Angola, in Africa.

The price of slaves, and other commodities here negotiated, as also the duties paid the petty kings, are estimated on both sides in pieces. Thus those barbarians requiring ten pieces for a slave, the Europeans, in like manner, value the money, or merchandize, to be given in exchange, in pieces.

PIECE, in *Heraldry*, denotes an ordinary, or charge.

PIECES, in the *Military Art*, include all sorts of great guns and mortars.

These are also called *pieces of ordnance*, or *artillery*.

PIECES, *Field*. See *FIELD-PIECES*.

PIECES, *Battery*. See *GREAT GUNS*.

PIECES, *Garrison*. See *GARRISON*.

PIECE, *Poisoning a*. See *POISON*.

PIECE, *Soldier's*. See *FIRELOCK*.

PIECE, *Elevation of a*. See *ELEVATION*.

PIECE, *Quadrating of*. See *QUADRATING*.

PIECE-Work, in *Rural Economy*, that sort which is done by the great or piece. It is sometimes called task-work. This mode of working is becoming more general and necessary daily on account of the increasing price of labour; but in letting it, it requires that the farmer should be well acquainted with its nature, and the time it will take in performing it, or he will be liable to much imposition: he should likewise be a good judge of the proper manner of performing the work. Some are of opinion that the work is never so well done in this way. See *WORK*.

PIED, *Fr*. See *FOOT*.

PIED, or *ped de Roi*, is the French foot in the old system. See *FOOT* and *MEASURE*.

PIEDE, or *PIETE'*, *La*, in *Geography*, a town of Mexico.

PIEDI OREZZA, a town of the island of Corfica; 12 miles E.N.E. of Corte.

PIEDICORTE, a town of Corfica; 12 miles E.S.E. of Corte.

PIEDMONT, the most extensive province in the northern part of Italy, about 150 English miles in length by 100 of medial breadth. It is bounded on the N. by the Valais, on the E. by the duchies of Milan and Montferrat,

on the S. by the country of Nice and the territories of the Genoeve, and on the W. by Savoy. This principality was first inhabited by Umbrians, Etrurians and Ligurians, and afterwards by Gauls, upon their establishment in Italy, under Brennus, &c. which gave occasion to its being called "Cisalpine Gaul," or "Gaul on this side of the Alps," with regard to Rome. It became in a subsequent period a part of Lombardy, and in the 13th century formed a portion of the gradual acquisitions of the counts afterwards dukes of Savoy, and latterly kings of Sardinia. It is said to have derived its name from its situation "ad pedem montium." With regard to its revenue, when that of Sardinia was estimated at 1,085,000*l.*, Piedmont contributed 953,750*l.*, Savoy 87,500*l.*, and Sardinia only 43,750*l.* This province is pleasant and fruitful, and the air mild and pure: the plains produce in abundance wheat, maize, rice, with some olives and wine, and the pasturages feed large herds of cattle. The soil is a rich sandy loam, with some tracts of large gravel brought down from the rivers; but the heat is excessive in summer, and the winter cold very severe; and yet the silk is esteemed of the finest quality. Around Turin, and through a great part of the province, artificial irrigation, or the watering of meadows, is practised with great assiduity and success. The surrounding Alps are rich in minerals, and they supply numerous streams which fertilize the plains. In the duchy of Aosta, the mines of copper, accompanied with antimony, arsenic, and zinc, are numerous: and in the superior regions near Macuguaga, there are mines of gold, found in marcasite and quartz; in the vale of Sella are the gold mines of St. Maria and Cavavechia, also containing silver. Gold is likewise found in the mountains of Challend near the vale of Aosta; and the torrent Evenfon rolls down pebbles of quartz, veined with that precious metal. Not far to the E. of Mont Blanc, a rich vein of cobalt has been lately discovered; and plumbago or black lead has been observed near the baths of Binay. This principality contains a great number of cities, towns and villages, so that the whole country has been denominated a large city. Its capital is Turin, which is an archiepiscopal see; besides which there are eight bishoprics. The principal rivers are the Po, the Tanaro, the Sturia, and the Doria. The chief exports consist of silk, which are chiefly manufactured at Lyons, some hemp, and large herds of cattle. In the year 1802, the whole country was annexed to the French republic, and divided into six departments, under the names of the Po, Doria, Marengo, Sezia, Stura, and Tanaro.

PIEDOUCHE, *French*, formed from the Italian *peduccio*, *foot*, in *Architecture*, a little stand, or pedestal, either oblong or square enriched with mouldings, serving to support a bust, or other little figure. This is called a bracket pedestal.

PIEDRA DE LA HYADA, in *Natural History*, the name given by the Spaniards to a stone found in many parts of America, particularly in New Spain; and famous among the Indians for curing the colic on being applied to the navel. It is green, and is a species of jasper, approaching to the nature of the lapis nephriticus, and is called by many *colicus lapis*, from its virtues.

PIEDRAHILA, in *Geography*, a town of Spain, in the province of Leon; 26 miles W.N.W. of Avila.

PIEDRAS, a river of Terra Firma, which runs into the Caribbean sea, 40 miles E. of Cape Aguja.

PIEDROIT, in *Architecture*, a pier, or a square kind of pillar, part of which is hid within a wall.

The only thing in which it differs from a pilaster is, that the latter has a regular base and capital, which the other wants. See *PILASTER*.

PIEDROIT is also used for a part of the solid wall annexed to a door or window; comprehending the door-post, chambrante, tableau, leaf, &c.

PIEGAIO, in *Geography*, a town of Italy; 14 miles S.W. of Perugia.

PIELAWESI, a town of Sweden, in the government of Kuopio, seated on a lake; 35 miles N.W. of Kuopio.

PIELIS, a town of Sweden, in the government of Kuopio, on a large lake; 70 miles E.N.E. of Kuopio.

PIEMENTE, a town of Istria; 21 miles S. of Capo d'Istria.

PIENES, a small island of Japan, near the harbour of Sacca.

PIENIN, a town of Poland, in the palatinate of Cracow; 36 miles N. of Cracow.

PIENO, a town of Italy, in the department of the Montagna; 18 miles N. of Lecco.

PIENO, Ital. *Full*, in *Music*. Sometimes it implies energy or force. See RIPIENO.

PIENZA, in *Geography*, a town of Etruria, and the see of a bishop; 45 miles S. of Florence. N. lat. 43° 3'. E. long. 11° 34'.

PIE-POUDER COURT. See COURT.

PIER, in *Building*, derived from the French  *Pierre*, a stone, denotes a mass of stone, &c. opposed, by way of fortrefs, against the force of the sea, or a great river, for the security of ships that lie at harbour in any haven, such are the pier of Dover, described by Camden Brit. &c., the

pier of Ramsgate, and the haven pier of Great Yarmouth, mentioned 22 Car. II.

PIERS are also used in *Architecture* for a kind of pilasters, or buttresses, raised for support, strength, and sometimes for ornament.

PIERS, *Circular*, are called *massive columns*, and they are with or without caps, and are frequently seen in Saracenic architecture.

PIERS of a Bridge. See BRIDGE.

M. Belidor observes that, when the height of the piers is about six feet, and the arches are circular, it is sufficient to make their thickness the sixth part of the width of the arch, and two feet more; but when the arches become of a great span, the thickness of the piers may be reduced to the sixth part; but then the depression of the two feet doth not take place at once; that is, in an arch of above forty-eight feet, three inches are taken off for every six feet of increase of the width of the arch. The thickness of the piers supporting elliptic arches is greater than in the former proportion; thus, in an arch of seventy-five feet wide, the thickness of the pier, whose height is about six feet, should be 13.5 when the arch is circular, and fifteen feet when it is elliptical.

The same author makes the abutments one-sixth part more than the piers of the largest arch.

Mr. Muller has calculated the following table, containing the thickness of the piers of bridges.

TABLE containing the Thickness of the Piers of Bridges.

	6	9	12	15	18	21	24
20	4.574	4.918	5.165	5.350	5.492	5.610	5.698
25	5.490	5.913	6.216	6.445	6.645	6.801	7.930
30	6.386	6.816	7.225	7.513	7.746	7.939	8.102
35	7.258	7.786	8.200	8.532	8.807	9.037	9.233
40	8.404	8.691	9.148	9.523	9.835	10.101	10.328
45	8.965	9.579	10.077	10.489	10.837	11.136	11.394
50	9.805	10.454	10.987	11.435	11.817	12.146	12.434
55	10.640	11.245	11.882	12.364	13.019	13.149	13.218
60	11.400	12.110	12.718	13.281	13.723	14.109	14.314
65	12.265	13.025	13.648	14.185	14.654	15.082	15.433
70	13.114	13.869	14.517	14.049	15.573	16.011	16.400
75	14.000	14.705	15.336	15.965	16.480	16.940	17.354
80	14.747	15.542	16.234	16.842	17.381	17.864	18.298
85	15.513	16.328	17.041	17.674	18.237	18.742	19.194
90	16.373	17.102	17.929	18.578	19.157	19.679	20.152
95	17.184	17.826	18.772	19.438	20.036	20.577	21.068
100	17.991	18.848	19.610	20.293	20.908	21.466	21.976

The first horizontal line expresses the height of the piers in feet, from 6 to 24 feet, each increasing by 3: the first vertical column, the width of arches from 20 to 100 feet, for every 5 feet.

The other columns express the thickness of piers in feet and decimals, according to the respective height at the head of the column, and the width of the arch against it in the first column.

Rectangular piers are seldom used but in bridges over small rivers; in all others they project from the bridge by a triangular prism, which presents an edge to the stream, in order to divide the water more easily, to prevent the ice from sheltering there, as well as vessels from running foul against them. This edge is terminated by the adjacent surfaces at right angles to each other at Westminster bridge; but those of the Pont-royal, at Paris, make an acute angle of about 60°. However the French, in their later constructions, make this angle to terminate by two cylindrical surfaces, whose bases are arcs of 60 degrees. Muller's *Pract. Fortif.* part iv. sect. 1. p. 257, &c.

**PIER Head**, in *Geography*, a cape on the north-east coast of New Holland, and west point of Thirsty sound.

**PIERA**, a town of Spain, in Catalonia; 16 miles N.W. of Barcelona.

**PIERACO**, a town of the marquissate of Ancona; 5 miles N. of Ancona.

**PIERAGE**, money paid for the use of a pier.

**PIERBACH**, in *Geography*, a town of Austria; 8 miles N.N.W. of Grein.

**PIERCE'S ISLAND**, a small island in Piscataqua river.

**PIERCEA**, in *Botany*, a name of Miller's, most unfortunately constructed, though well intended, to honour the late duke of Northumberland; so that it ought to have been *Percya* or *Percæa*. That great patron of Botany, and distinguished cultivator, to whom the science is so much indebted, has certainly long merited such a compliment, in preference to a cloud of names, in every respect far inferior; but Miller's supposed genus is not in any respect different from **RIVINA**. See that article.

**PIERCED**, **PERCE'**, in *Heraldry*, is when an ordinary is perforated, or struck through; shewing, as it were, a hole in it.

This piercing is said to be expressed in blazon as to its shape: thus if a cross have a square hole, or perforation in the centre, it is blazoned, *square-pierced*, which is more proper than *quarter-pierced*, as Leigh expresses it; and accordingly the French call it *percé en quarré*. When the hole or perforation is round, it must be expressed *round-pierced*; which Gibbon in Latin calls *perforata*; because all holes made with pierces, or augers, are round. If the hole in the centre be in the shape of a lozenge, it is expressed *pierced lozenge-ways*.

All piercings must be of the colour of the field, because piercing implies the shewing of what is under the ordinary, or bearing. And when such figures appear on the centre of a cross, &c. of another colour, the cross is not to be supposed pierced, but that the figure on it is a charge, and must be accordingly blazoned.

**PIERCED Island**, in *Geography*, a small island or rock, in the gulf of St. Lawrence, pierced with two natural arches, through which the sea passes; 15 miles S. of Cape Gaspe.

**PIERCING**, among *Farriers*. To pierce a horse's shoe lean, is to pierce it too near the edge of the iron. To pierce it fat, is to pierce it farther in.

**PIERCY**, in *Geography*, a town of America, in N. Hampshire, and county of Coos, containing 211 inhabitants.

**PIERCY Island**, a small island near the east coast of New Zealand; east of Cape Brett.

**PIERIA**, in *Ancient Geography*, a country of Syria, in the Seleucid territory. This country derived its name from mount Pierius or Pieria, which the Macedonians so called after mount Pierius in their own country. It was the most southern country, and touched on Thessaly, from which it was separated by mountains.—Also, a town of Macedonia.—Also, a mountain of Syria, which, according to Strabo, extended from the south to the north, and joined with mount Amanus. This mountain took its name from that of Greece.—Also, a town of Greece, in Bœotia, afterwards called Lyncos.

**PIERIDES**, among the *Ancients*, an epithet given to the Muses, upon account of their having been born in that part of the country of Macedon which was called *Pieria*.

**PIERIUS MOUNTS**, in *Ancient Geography*, a mountain of Asia, in Syria, on the coast of the Mediterranean sea, between the gulf Issicus to the north and the mouth of the river Orontes; about lat. 36° 15'.

**PIERMONT**, in *Geography*, a town of America, in the state of N. Hampshire, and county of Grafton, containing 877 inhabitants.

**PIEROUGAMIS**, a tribe of Indians in Canada, who inhabit the west bank of the lake of St. John.

**PIERRE**, a town of France, in the department of the Saone and Loire, and chief place of a canton, in the district of Louhans; 15 miles N. of Louhans. The place contains 1510, and the canton 12,408 inhabitants, upon a territory of 255 kilometres, in 18 communes.

**PIERRE Buffiere**, a town of France, in the department of the Upper Vienne, and chief place of a canton, in the district of Limoges; 9 miles S.S.E. of Limoges. The place contains 813, and the canton 8093 inhabitants, on a territory of 217½ kilometres, in 10 communes.

**PIERRE a l'Oiffeau**, a small island in the English channel, near the coast of France. N. lat. 48° 54'. W. long. 3° 24'.

**PIERRE Pertuis**, a pass in mount Jura, cut out of a rock; 8 miles N.W. of Biemme.

**PIERRE d'Albigny, St.**, a town of France, in the department of Mont Blanc, and chief place of a canton, in the district of Chambéry. The place contains 2714, and the canton 6943 inhabitants, on a territory of 70 kilometres, in 6 communes.

**PIERRE-Eglise, St.**, a town of France, in the department of the Channel, and chief place of a canton, in the district of Valognes. The place contains 1619, and the canton 13,342 inhabitants, on a territory of 170 kilometres, in 20 communes.

**PIERRE d'Oleron, St.**, a town of France, in the department of the Lower Charente, and chief place of a canton, in the district of Marennnes. The place contains 4249, and the canton 9653 inhabitants, on a territory of 135 kilometres, in 3 communes.

**PIERRE-Lette**, a town of France, in the department of the Drome, and chief place of a canton, in the district of Montelimart. The place contains 2536, and the canton 12,534 inhabitants, on a territory of 327½ kilometres, in 14 communes.

**PIERRE-le-Moutier, St.**, a town of France, in the department of the Nièvre, and chief place of a canton, in the district of Nevers. The place contains 1969, and the canton 8615 inhabitants, on a territory of 310 kilometres, in 10 communes.

**PIERRE sur Dives, St.**, a town of France, in the department of the Calvados, and chief place of a canton, in the district of Lisieux. The place contains 1499, and the canton 9287 inhabitants, on a territory of 145 kilometres, in 28 communes.

**PIERRE d'Automne**, a French name translated from the Chinese.

Chinefe. It is the name of a medicinal ſtone, famous throughout the Eaſt for curing all diſorders of the lungs. Many people ſuppoſe it had its name of the *autumn-ſtone*, from its being only to be made at that ſeaſon of the year; but it may be made equally at all times, and the origin of the name is to be farther ſearched into.

The Chineſe chemiſts, like thoſe of all other nations, delight in a fort of gibberiſh. A part of this is, the referring the ſeveral parts of the body to the ſeveral ſeaſons of the year. The lungs are in this ſcheme referred to autumn. This appears in their writings; and thus the ſtone for diſeaſes of the lungs came to be called *autumn-ſtone*.

It is a tedious preparation of human urine, and made as follows: they put thirty pints of the urine of a ſtrong and healthy young man into a large iron pot, and ſet it over a gentle fire; and when it begins to boil, they add to it, drop by drop, about a large tea-cup full of rape-oil; it is then left on the fire till the whole is evaporated to a thick ſubſtance reſembling black mud; they then take it out of the pot, and laying it on a flat iron, they dry it ſo that it may be powdered very fine.

This powder they moiſten with freſh oil, and put the maſs into a double crucible, ſurrounded with coals, where it ſtands till thoroughly dried again. They finally powder this again, and putting it into a china-veſſel, covered with ſilk cloth and a double paper, they pour on boiling water, which makes its way, drop by drop, through theſe coverings, till ſo much is got in as is ſufficient to reduce it to a paſte. This paſte is well mixed together in the veſſel it is kept in, and this is put into a veſſel of water, and the whole ſet over the fire. The matter thus becomes again dried in *balneo Mariæ*, and is then finiſhed. *Obſerv. ſur les Couû. de l'Asie*, p. 258.

*PIERRE de Cayenne*, in *Ornithology*. See *PHASIANUS Pauxi*.

*PIERREFITTE*, in *Geography*, a town of France, in the department of the Meufe, and chief place of a canton, in the diſtrict of Commercy; 7 miles W. of St. Michael. The place contains 660, and the canton 9249 inhabitants, on a territory of  $357\frac{1}{2}$  kilometres, in 27 communes.

*PIERREFONTAINE*, a town of France, in the department of the Doubs, and chief place of a canton, in the diſtrict of Baume. The place contains 1110, and the canton 7889 inhabitants, on a territory of  $272\frac{1}{2}$  kilometres, in 21 communes.

*PIERREFORT*, a town of France, in the department of the Cantal, and chief place of a canton, in the diſtrict of St. Flour. The place contains 1266, and the canton 8905 inhabitants, on a territory of  $287\frac{1}{2}$  kilometres, in 11 communes.

*PIERRES SONORES*, ſtones that have a metalline ſound, of which muſical inſtruments of percussion are made in China. See *CHINESE Muſic*.

*PIERREVILLE, St.*, in *Geography*, a town of France, in the department of the Ardèche, and chief place of a canton, in the diſtrict of Privas. The place contains 1471, and the canton 7856 inhabitants, on a territory of  $147\frac{1}{2}$  kilometres, in 7 communes.

*PIERSZAIÉ*, a town of Lithuania, in the palatinate of Wilna; 60 miles E. of Lida.

*PIERUS*, or *PEIRUS*, in *Ancient Geography*, a river of the Peloponneſus, in Achaia Propria, which traversed the territory of the town Pharaë. Strabo ſays that it diſcharged itſelf into the Achelous.—Alſo, a lake of Theſſaly.—Alſo, a mountain of Macedonia. It is ſaid that a perſon, named Pierus, eſtabliſhed on this mountain the worſhip of the Muſes, whence they were denominated “*Pierides*.”

*PIES*, in our *Ancient Law-Books*. *Freres Pies* were a

fort of monks, ſo called becauſe they wore black and white garments, like magpies; the ſame, we ſuppoſe, with thoſe ſince called Carmelites, who, for a like reaſon, were anciently called by the French *Freres Barrez*.

They are mentioned by Wallingham, p. 124. “*In quodam veteri cœmeterio, quod fuerat quondam fratrum, quos Freres Pies veteres appellabant.*”

*PIESKE*, in *Geography*, a town of Lithuania, in the palatinate of Novogrodek; 40 miles W.S.W. of Novogrodek.

*PIESMA*, a word uſed by the ancients to expreſs the remaining maſs, after the expreſſion of any fluid ſubſtance from among its moſt ſolid parts. Thus the cake remaining in the bag, after the expreſſion of oils, is called by this name; but there are inſtances of authors calling the expreſſed juice, inſtead of the reſiduum, by this name. Thus Dioſcorides calls the expreſſed juice of the bay-berries, the *pieſma laurinum*; and others, the expreſſed juice of roſes, *pieſma roſarum*, paying no regard to the roſe-cake left behind.

*PIESTER*, the name uſed by the ancients for the preſs which they employed in preparing the ſeveral juices of plants, &c.: hence the word *pieſma*; which ſee.

*PIESTRON*, a word uſed by Hippocrates to expreſs a fort of forceps, which he recommends to be uſed in difficult labours, to break the bones of the cranium of the fœtus, when its head is too large to paſs it to paſs whole. It was alſo called *embryſtlaſtes*.

*PIETANTIA*, or *PITTANCE*, a portion of victuals diſtributed to the members of a college, or other community, upon ſome great feſtivals.

*PIETANTIARIUS*. See *PITANCIARIUS*.

*PIETERMAN*, in *Ichthyology*, the name uſed by ſome for a fiſh of the cuculus kind, approaching to the nature of the *draco marinus*, or weaver; and more uſually called among authors by its Braſilian name, *niqui*.

*PIETISTS*, in *Eccleſiaſtical Hiſtory*, a religious ſect that ſprung up towards the cloſe of the 17th century, among the Proteſtants of Germany; ſeeming to be a kind of mean between the Quakers of England, and the Quietiſts of the Romiſh church.

This ſect originated in the zeal of certain perſons, who, with the beſt intentions, endeavoured to ſtem the torrent of vice and corruption, and to reform the licentious manners both of the clergy and of the people. However, many, deluded by the ſuggeſtions of an irregular imagination, and an ill-informed underſtanding, or guided by principles and views of a more criminal nature, ſpread abroad new and ſingular opinions, falſe viſions, unintelligible maxims, aultere precepts, and imprudent clamours againſt the diſcipline of the church: all which excited the moſt dreadful tumults, and kindled the flames of contention and diſcord.

The learned Spener was at the head of the firſt reformers, who, by the private ſocieties he formed at Frankfort, with a deſign to promote vital religion, rouſed the luke-warm from their indifference, and excited a ſpirit of vigour and reſolution in thoſe who had been ſatiſfied to lament in ſilence the progreſs of impiety. With this view he publiſhed a book, entitled “*Pious Deſires*,” in which he repreſented in an affecting manner the diſorders of the church, and propoſed the remedies that were proper to heal them. The religious meetings above-mentioned, or colleges of piety as they were called, however well deſigned in their original eſtabliſhment, tended in many places to kindle in the breſts of the multitude the flames of a blind and intemperate zeal, whoſe effects were impetuous and violent;

violent;

violent: so that these institutions of pietism became objects of reproach and occasions of complaint.

The tumult this produced was farther promoted by the commotions that arose at Leipzig in the year 1689, when certain pious and learned professors of philosophy undertook to explain the scriptures in their colleges, with a view of forming candidates for the ministry into a more accurate acquaintance with these sources of religious knowledge. The novelty of this method of instruction excited attention, and the lectures that were delivered to this purpose were much frequented. Suspicions and rumours of an unfavourable kind were soon industriously propagated, and the professors were prohibited from pursuing the plan of religious instruction which they had undertaken. During these troubles and divisions, the invidious denomination of Pietists was first invented; or at least before this period it was not commonly known. It was originally applied by some inconsiderate persons to those who frequented the biblical colleges, and lived in a manner suitable to the instructions and exhortations that were there addressed to them; and afterwards it was used to characterise all who were distinguished by the excessive austerity of their manners, or who, regardless of truth and opinion, were only intent upon practice, and turned the whole vigour of their efforts towards the attainment of religious feelings and habits. At this time the denomination was also sometimes applied to persons whose motley characters exhibited an enormous mixture of profligacy and enthusiasm, and who better deserved the title of delirious fanatics. The contest, thus begun, very soon spread through all the Lutheran churches in the different states and kingdoms of Europe. Many persons of various ranks and professions, of both sexes, learned and illiterate, pretended a divine impulse for pulling up iniquity by the root, and restoring to its primitive lustre the declining cause of piety and virtue, and for establishing a better discipline in the Christian church. Assemblies, similar to those established by Spener, were introduced for this purpose into Leipzig and other places: but they were not all conducted with prudence and order. Into these assemblies there were introduced several extravagant and hot-headed fanatics, who foretold the destruction of Babel, *i. e.* the Lutheran church; who terrified the populace with fictitious visions, assumed the authority of prophets honoured with a divine commission, revived doctrines that had long before been exploded and condemned, declared the approach of the millennium, and were guilty of many outrages against order and peace. The governors of the church and of the state were alarmed at the progress of the divisions which these enthusiasts produced, and many severe laws were enacted against the Pietists. These revivers of piety were of two kinds: one sect, at the head of which was Spener, proposed to carry on their plan without introducing any change into the doctrine, discipline, or form of government in the Lutheran church: the other party were for introducing considerable alterations both in doctrine and ecclesiastical polity. Many mistakes have been occasioned by confounding these two parties; the former of which were zealously intent upon a very important object, the revival of piety, and, with this view, the reformation of public seminaries, where ministers were educated, both as to the mode of instruction and the extent of discipline: but the latter were, for the most part, totally destitute of reason and judgment; their errors were the reveries of a disordered brain; and they were rather to be considered as lunatics than as heretics. Some among them were less extravagant, and tempered the singular notions they had derived from reading or meditation, with

a certain mixture of the important truths and doctrines of religion. They were mostly, however, of the mystic kind. For a more particular account we must refer to Mosheim's *Eccles. Hist.* vol. iv. 8vo.

Many gross errors are charged on the Pietists, in a book intitled "Manipulus Observationum Antipietisticarum;" but they have too much the severity of polemical exaggeration; at least it is certainly so with regard to a great part of them.

In effect, there are Pietists of several kinds: some run into gross illusions, and carry their errors to the overturning a great part of the Christian doctrine; others are only visionaries; and others very honest and good people, who, disgusted with the coldness and formality of other churches, and charmed with the fervent piety of the Pietists, are attached to their party, without giving in to the grossest of their errors.

PIETISTS, otherwise called the "Brethren and Sisters of the Pious and Christian Schools," a society formed in the year 1678, by Nicholas Barre, and obliged, by their engagements, to devote themselves to the education of poor children of both sexes.

PIETOSA, in the *Italian Music*, signifies to play or sing in a soft manner, fit to move pity or compassion.

PIETRA CASTELLO, in *Geography*, a town of Naples, in Capitanata; 6 miles N.W. of Volturara.—*P. Corbara*, a town of Corsica; 11 miles N. of Bastia.—*P. Galla*, a town of Naples, in Basilicata; 2 miles S.S.W. of Accerenza.—*P. Mala*, a town of Naples, in Calabria Citra; 11 miles S. of Cosenza.—*P. Malera*, a town of Naples, in Lavora; 7 miles N. of Capua.—*P. Maura*, a town of Naples, in Capitanata; 4 miles N.W. of Lefina.—*P. Paula*, a town of Naples, in Calabria Citra; 4 miles W.N.W. of Cariati Vecchia.—*P. Pertosa*, a town of Naples, in Basilicata; 12 miles S.E. of Potenza.—*P. Prezia*, a town of Sicily, in the valley of Noto; 10 miles S.W. of Castro Giovanni.—*P. Pugno*, a town of Corsica, in the department of Corté.—*P. Pulcina*, a town of Naples, in Principato Ultra; 3 miles N. of Benevento.—*P. Pulema*, a town of Naples, in Principato Ultra; 9 miles N.N.E. of Benevento.—*P. di Roma*, a town of Sicily, in the valley of Demona, on the N. coast; 18 miles W. of Pati.—*P. Sama*, a town of the republic of Lucca; 12 miles W. of Lucca.—*P. Santa*, a town of Etruria; 6 miles S.E. of Messa.—*P. Vairan*, a town of Naples, in Lavora; 11 miles E. of Sezza.

PIETRA Mala, a mountain that rises in the middle of the Apennines on the road to Bologna, about 40 miles from Florence. This mountain is rendered remarkable by a flame that spreads over a small part of its surface, and burns almost continually without producing any of those destructive effects which accompany volcanic explosions.—A similar phenomenon is observed on the side of a mountain about four miles from Cavigliano: here the flame, which shews itself low down on the declivity of the mountain, covers a space of about 140 feet; and it runs along in crevices, and burns much stronger in some places than in others. Its colour is either bright yellow, or blue, like spirits of wine, and it rises little more than half a foot from the surface; but in rainy weather, and particularly in winter, it is said to increase considerably, and mount to the height of six or seven feet. It was extinguished in some places by waving hats strongly over it, and reproduced by firing a pistol into a small train of gunpowder, and sometimes by merely throwing a lighted paper upon the spot where it had disappeared. It emits a strong odour, resembling that of ether. Naturalists are divided in their opinions

as to the cause of this phenomenon: some suppose it to be electric, others phosphoric, and others again volcanic. In favour of this latter opinion, it is alleged that there are vestiges of ancient eruptions in the neighbourhood; that shocks of earthquakes frequently agitate the surrounding mountains; and that sulphureous bubbles are perceivable in the vicinity, which are so inflammable as to take fire at the approach of a torch, &c. But on the other hand, it is said, that if the flames of Pietra Mala proceeded from any such cause, the ground over which they hover must be heated, and its heat increase if opened, because it would be nearer the subterranean furnace. On the contrary, the flame in this mountain communicates but little heat when burning, and when extinguished leaves the ground cold, and without the usual vestiges of fire. Hence others have been led to ascribe it to a sort of oily substance or petroleum, with which they suppose the adjacent earth to be impregnated. But if this were the cause, it is said, that the flames, instead of being increased, would be diminished or extinguished by the rains and tempests of winter, and the crevices which emit the flame must exhibit some traces of this oily vapour; but the flame glows with the greatest vivacity in winter, and the soil manifests no appearance of any oily or bituminous substance. The first of these facts is equally decisive against the operation of the electric fluid and phosphoric exhalations. Whatever be its cause, the flame illuminates the whole tract around it, and banishes the horror of night from one of the most dreary solitudes of the Apennines. Similar phenomena were observed in or near the same region anciently, as Pliny the elder (lib. xi. cap. 3.) notices the appearances of flames in the territory of Mutina, which includes the neighbouring Apennines.

PIETRA *Embofcata*, in *Natural History*, a name given by the Italians to the Florentine marble, so remarkable for its delineations.

This marble is found in thin strata, and is full of cracks: in these cracks there is usually found a black mineral matter, which, getting into the substance of the stone a little way on each side of the crack, forms there various delineations, or the figures of pieces of moss, bushes, and the like: the paler pieces of the marble usually have these delineations; the darker coloured having the forms of trees and houses, or the ruins of old buildings.

PIETRAFEZA, in *Geography*, a town of Naples, in Basilicata; 7 miles S.W. of Potenza.

PIETRAGRUA, CARLO LUIGI, of Florence, in *Biography*, a master of considerable reputation in his day, composed two operas for Venice; "Il Pastor Fido," in 1721; and "Romolo e Tazio," in 1722. Professors speak of Pietragrua in such terms as remove all doubt of his merit.

PIETRALBO, or PETRALBO, in *Geography*, a town of the island of Corsica; 10 miles S. of St. Fiorenzo.

PIETY, *Mounts of*. See MOUNT.

PIEVE, in *Geography*, a town of Genoa; 2 miles N.W. of Albenga.

PIEVE, *La*, a town of Italy, in the department of the Lower Po, on the Reno, surrounded with an earthen rampart and a ditch.

PIEVE *del Duca*, a town of Italy, in the department of the Rubicon; 4 miles W. of Rimini.

PIEVE *del Moua*, a town of Italy, in the department of the Upper Po; 5 miles E.N.E. of Cremona.

PIEVE *St. Giacomo*, a town of Italy, in the department of the Upper Po; 7 miles E. of Cremona.

PIEVE *a Sieve*, a town of Etruria; 10 miles E. of Florence.

PIEVE *di Cadora*. See CADORA.

PIEVE *di Sacco*, a town of Italy, in the Paduan, on a canal called Fiumcello, containing 5100 inhabitants; 10 miles E. of Padua.

PIEVE *de St. Maurizio*, a town of Italy, in the department of the Upper Po; 12 miles E. of Cremona.

PIEVE *St. Stefano*, a town of Etruria, on the Tiber; 15 miles N. of Arezzo.

PIEUX, LES, a town of France, in the department of the Channel, and chief place of a canton, in the district of Valognes; 12 miles W. of Valognes. The place contains 1398, and the canton 10,420 inhabitants, on a territory of 170 kilometres, in 15 communes.

PIEXE-GALLO, in *Ichthyology*, a name given by the Portuguese to a fish caught about the shores of the Brasils, and much resembling our *doree* or *faber piscis*; more usually known among authors by its Brazilian name, *abacatuia*.

PIEXE-*Porco*, a name by which some authors have called the *monoceros*, or unicorn-fish of Clusius. The name is Portuguese, and signifies hog-fish, this little creature having a mouth like a hog.

PIEXMAHL, in *Geography*, a town of Sweden, in the government of Kuopio; 39 miles S.S.W. of Kuopio.

PIFENDEL, in *Biography*, an eminent performer on the violin, in the service of Augustus II., king of Poland. According to Quantz, Pifendel had in his youth received instructions in singing from Pistocchi, and on the violin from Tofelli. Quantz is very warm in his praises, calling him a profound theorist, a great performer, and a truly honest man. It was from this worthy concert-master, says he, that I learnt to play an adagio, and to compose in many parts.

Pifendel had in his youth travelled through France and Italy, where he had acquired the peculiarities in the taste of both countries, and so blended them together as to form a third genus, a mixed style of writing and playing, which was half French and half Italian. Influenced by his example, Quantz declares that he always preferred this compound style to that of Italy, France, or the national style of his own country.

PIFFERO, Ital. a flute, lute, or flageolet.

PIG, a small animal of the hog or swine kind. See HOG, and SWINE.

PIG, *Guinea*. See CAVIA *Cobaya*.

PIG-Nut, or *Earth-nut*, in *Botany*. See BUNIAM.

PIG-Nut. See WALNUT-Tree.

PIG-Cafe, in *Agriculture*, a sort of narrow case or stall, in which an animal of this kind is confined while it is undergoing the process of fattening, so as not to be able to turn itself completely round, by which it is supposed to fatten better and more expeditiously, as well as with a less quantity of food in proportion to that which is used for equal sized animals fed in other methods.

These cases are constructed in separate divisions, in such a manner, that each of them may contain a pig, and fit him as nearly as possible when he is in it; but he must not be able to turn himself round; there is, however, a space left at the bottom of each of them, by which he is enabled to lie down at pleasure, in which case his feet pass through the space left. Upon one side of such buildings there is usually a range of small troughs in the walls or boardings, and on the other a row of sliders, which shut the pigs in. The paving in the bottoms of these divisions slopes gently backwards to prevent wetness, and no litter is ever employed in them, but they are kept clean and sweet by the use of a hoe and broom.

Pig-cases of this sort are sometimes raised from foundations laid in the ground, and at others erected upon wheels

in a kind of wooden building, so as to move about on grass-land. They are frequently met with in the neighbourhood of Maldon in Essex, and will be more fully noticed in speaking of swine. See SWINE.

**PIG-Stie**, in *Rural Economy*, the name of the place where hogs are kept. Buildings of this kind should always be large and commodious. See *Hog-Stie*.

**PIG-Tail**, in *Agriculture*, a provincial term sometimes applied to a small strip of ground generally in the state of grass.

**PIG of Lead**, the eighth part of a fother; amounting to about 250lb. weight.

**PIG Creek**, in *Geography*, a river of Virginia, which runs into the Staunton, N. lat.  $36^{\circ} 52'$ . W. long.  $79^{\circ} 42'$ .

**PIG Iron**, in the *Iron Works*. Those masses of iron which result from the first process of extracting from the ore, are called *pigs*, and in this state it is called *pig iron*. It is principally used to distinguish it from bar iron, which is malleable, and nearly pure iron. Pig iron is of various qualities, according to the quantity of carbon it contains. The highest carburet is called N<sup>o</sup> 1, the next N<sup>o</sup> 2, and so on. That containing the lowest dose of carbon, which is known by its white fracture, and greater hardness, is called *forge pig*, because it has been thought the most fitted for making malleable iron. See the article IRON.

**PIGALLE, JOHN BAPTIST**, in *Biography*, an eminent French sculptor, was born at Paris in 1714. He was the son of a carpenter employed about the royal buildings, and shewed an early fondness for modelling, which at length gave him a desire for excelling in the art of sculpture. He spent three years at Rome in copying after the antique, and on his return stopt at Lyons, where he met with employment which occupied him a year and a half. Here he finished his model of the statue of Mercury, which he brought with him to Paris, where it was greatly admired. It was some time before he met with encouragement; but at length he excited the attention of the minister, and of Mad. Pompadour, who obtained for him many commissions. He was admitted into the academy of painting and sculpture in 1744, and having executed his Mercury in marble, he made a Venus for its companion, which was equally the subject of praise. Both these statues were presented by the king to Frederic of Prussia. Pigalle was employed, in 1756, to execute a mausoleum for marshal Saxe, which was said to be the grandest composition in sculpture that exists. This caused him to be employed for the monument erected in 1765, by the city of Rheims, to the glory of Lewis XV. In 1780 he was employed on a grand monument for the count d'Harcourt. His concluding piece was the figure of a young girl taking a thorn out of her foot, which was greatly admired for its beauty and delicacy. He died in 1785, being then rector and chancellor of the academy. As an artist he was entirely indebted to study and application: his skill was rather talent than genius, and his ideas were rather just than extensive.

**PIGAYA**, in *Natural History*. See PYGAYA.

**PIGEON**, in *Ornithology*. See COLUMBA.

**PIGEON**, in *Rural Economy*, a well-known domestic bird. There are only two distinct sorts of pigeons, the wild and the tame; and the tame rough-footed ones differ not much from the wild, only they are somewhat bigger, and more familiar: the wild usually perch upon trees, being more seldom seen on the ground. They are such as breed in woods, sea-rocks, &c. and the tame such as are bred in dove-houses.

But the varieties in the tame sort are numerous, and distinguished by a variety of different names, as carriers, crop-pers, pouters, horkemen, runts, jacobins, turbits, helmets,

nuns, tumblers, barbs, petits, owls, spots, trumpeters, shakers, turners, finikins, &c. from which, when differently paired, are bred bastard pigeons, such as are called from the cropper or pouter, and the carrier, pouting horkemen; from the tumbler and the horkemen, dragoons. These, however, deserve little attention, being only kept for fancy, and not profit, though the same method is used in breeding them.

And there are different sorts of runts, one called Spanish runt; generally of a blood-red or mottled colour: they are very loose feathered, and large bodied, but breed not so often as the smaller sorts.

The horkemen are excellent breeders, and are not easily took; the common English runt is also a good sized pigeon, and breeds well.

Also the pigeon called the Leghorn is a sort of runt, only distinguished by a little wattle over his nostril: he is a full bodied pigeon, whose feathers lie close to the body, and is an excellent breeder, and generally of a grizzled colour, ermined round the neck.

It may be noticed that those who keep pigeons for the purpose of breeding, should have bastard bred pigeons, such as pouting horkemen, pouting dragoons, from a pouter or cropper, and a Leghorn; as such pigeons will breed nine or ten pair of young ones in the year; and when they have young ones they feed them well.

But of those kinds which are bred in pigeon-houses, the grey pigeon, inclining to ash colour and black, is the best; and generally shews fruitfulness by the redness of the eyes and feet, and by the ring of gold colour which is about the neck.

In respect to the time of stocking there are two seasons in the year at which the pigeon-house may be supplied: the first is May; for the pigeons having much strengthened themselves during the winter, are in a condition soon to yield profit to the buyer. Secondly, in August, when there are a great number of young pigeons that have been well fed with corn, from the harvest in that season. In general pigeons will live about eight years, but they are only prolific for the first four years; afterwards they are worth nothing, for when they are once past that age all they do is, to prevent the profit that might be reaped by others that are younger. It is something difficult to know how to distinguish their age, and requires experience.

And the runts may be distinguished again into greater or smaller: those which are called the Spanish runts are much esteemed, being the largest sort of pigeon, but are sluggish and more slow of flight than the smaller sorts of runts: but the smaller runts are better breeders, and quicker of flight, for which they are esteemed. As for the colours of their feathers, they are uncertain, so that a judgment cannot be made of the sort by them.

The next sort which makes the largest figure, but is not, in reality, the largest bird, is the cropper, so called, because they usually, by attracting the air, blow up their crops to an extraordinary bigness, even so as to be sometimes as large as their bodies. This sort is the most valued, according as it can swell up its crop. The bodies of this sort are about the bigness of the smaller runts, but are somewhat more slender: this sort also is of various colours in the feathers.

The shakers are of two sorts, *viz.* the broad-tailed shaker, and the narrow-tailed shaker: these are so called, because they are almost constantly wagging their heads and necks up and down; the broad are distinguished from the narrow, in that the broad-tailed sort abounds with tail-feathers about twenty-six in number; but the narrow-tail

## PIGEON.

shakers have not so many. These, when they walk, carry their tail-feathers and crest spread abroad like a turkey-cock: they have likewise a diversity of feathers.

The jacobins, or cappers, are so called on account of certain feathers which turn up about the back part of the head: some of this sort are rough-footed; they are short billed, the iris of their eye of a pearl colour, and the head is commonly white.

The turbit, which some suppose to be a corruption of the word corbeck, or curtbeke, as they are called by the Dutch, which seems to be derived from the French, courtbeck, and signifies a short bill, for which this pigeon is remarkable; has the head flat, and the feathers on the breast spread both ways; these are much of the same size with the jacobines.

The carriers are those pigeons which are said to have been employed sometimes in carrying letters, &c. They are about the size of common pigeons, and of a dark blue or blackish colour, which is one way of distinguishing them from other sorts: they are also remarkable for having their eyes compassed about with a broad circle of naked spongy skin, and for having the upper chap of their beak covered more than half from the head, with a double crust of the like naked fungous body. The bill, or beak, is moderately long, and black.

The barb, or Barbary pigeon, is another sort, whose bill is like that of the turbit, short, and thick, having a broad and naked circle of a spongy white substance round about the eye, like that of the carrier pigeon; the iris of the eye is white, if the feathers of the pinion are inclinable to a darker colour, but if red they are white, as it is observed in other birds.

The smiters are supposed to be the same the Dutch call dragons: these shake their wings as they fly, and rise commonly in a circular manner in their flight, the males, for the most part, rising higher than the females, and frequently falling and flapping with their wings, which makes a great noise that may be heard a great way off, which often is the cause of their breaking or shattering their quill-feathers. These very much resemble the tumbler pigeon; the difference chiefly is, that the tumbler is somewhat smaller, and in its flight will tumble itself backward over its head; the diversity of colours in the feathers makes no difference.

The helmet pigeon is distinguished from the others, because it has the head, the quill-feathers, and the tail-feathers, always of one colour, sometimes black, sometimes white, or red, or blue, or yellow, but the other feathers of the body are of a different colour.

The light horseman; this is supposed to be a cross between a cock cropper and a hen of the carrier breed: because they seem to partake of both, as appears from the excrescence of flesh upon their bills and the swellings of their crops: these are not inclined to leave the place of their birth, or the house that they have been used to.

The bastard-bill pigeon is something bigger than the Barbary pigeon; they have short bills, and are generally said to have red eyes, though probably those coloured eyes belong only to those that have white feathers.

There is a pigeon called the turner, which is said to have a tuft of feathers hanging backwards on the head which parts like a horse's mane.

There is also a pigeon of the smaller sort, called the finikin, but in other respects like the former.

There is another pigeon called the spot, supposed to take its name from a spot on the forehead, just above the bill; and the feather of its tail is always of the same colour with the spots, and all the other feathers are white.

The Mahomet, or mawmet pigeon, supposed to be brought from Turkey, is singular for its large black eyes, but the other parts are like those of the Barbary pigeon.

It is necessary to observe that great care must be taken to make convenient places to breed in; each pair of pigeons must have two nests, those with baskets in them are best, as before one pair can go out of the nest, or feed themselves, the old ones will be sitting again. When the young ones are taken, clean out the nest, or put in a clean basket, for cleanliness is a circumstance of great consequence to the raising of pigeons.

Many suppose that, notwithstanding pigeon-houses are common on many farms, it is, in very few instances, that this kind of stock, when the various disadvantages of it are considered, can be converted to much profit by the farmer. And it has been well remarked by Mr. Pitt, in his Corrected Report of Staffordshire, that the increase of pigeons beyond a certain degree must, doubtless, be injurious to the cultivation of grain; within due bounds they do little harm; but increased beyond it, they prove pernicious vermin, both to the new sown crops, and the early part of harvest. They are particularly voracious in early peas; therefore, the advantages arising from their increase for consumption as food are more than counterbalanced by the mischief occasioned by their depredations. Mr. Kent also states that, in Norfolk, pigeons are much fewer than formerly, as many of the pigeon-houses have been dropped, on account of the injury which the pigeons do to thatched buildings. And the same is the case in Kent and other counties. They are particularly injurious to the grain crops first at the time of harvest, by settling in large flights upon the standing corn, and in this way doing more mischief by beating it down than by the quantity they consume, as Mr. Parkinson has noticed in his Experienced Farmer. It is stated, that where this sort of flock is kept warm sheltered, sunny situations are the most advantageous, as the pigeon delights in warmth, and in being exposed to the full influence of the sun. See *PIGEON-HOUSE*.

And it is also of importance in the economy of these birds that the floor of the house be nearly upon a level with the holes where they enter, and that these holes be not too large nor too numerous; the holes where they form their nests should not be much enclosed, as pigeons delight in being at liberty. Salts and strong scents, such as *assaetida*, are said to be agreeable to these birds, so as frequently to attach them to their habitations, when they would not under other circumstances.

Birds of this kind seldom lay more than two eggs at one laying, sitting about twenty days, the male and female alternately. They are capable of breeding frequently, but in general only produce two or three broods or flights in the year. Of all the several sorts the common blue pigeon is probably the most productive. The tumblers are small but very domestic. The writer of the Experienced Farmer, after recommending the harvest flight as the most proper for the purpose of stock, as being the strongest to withstand the winter season, gives the following directions on the management of them; in regard to feeding them, it is advised as only necessary during the season between seed time and harvest, when it should be done by three or four o'clock in the morning, as they rise early. If you serve them much later, they will keep hovering about home, and be prevented taking their necessary exercise. If fed the year round, they will not feed near so well as if forced to seek their own food, for they pick up in the fields what is pleasant and healthy to them, and from the beginning of the harvest to the end of seed time they find plenty. They may be fed with tares, grain,

grain, or seeds of any kind. He directs us to be cautious of not letting the first flight fly to increase the stock, but let every one of them be taken; as these will come in, in what is called benting time, that is, between seed time and harvest. It is then that pigeons are the scarcest; and many of the young ones would pine to death through weakness during that season, and that, at the latter end of every flight, care should be taken to destroy all those eggs which were not laid in a proper time. The proper time for the spring flight is in April and May. After the harvest flight cold weather begins to come on, which injures the old pigeon much if she sits late; and the young will be good for nothing if hatched.

And it is very necessary to pay attention to cleanliness in the management of the dove-cote, as already noticed. Before breeding time the holes ought to be carefully examined and cleaned, for if any of the young die in the holes in the summer time, maggots are soon bred in them; they become putrid, and emit a putrid and unwholesome stench, very injurious to the inhabitants of the dove-cote. Pigeons are tenacious of their nests, as appears from the conduct of the wood-pigeon, which will breed for years in the same tree, and the mother forsakes her nest with regret; but, unable to endure the filth and stench of her dead offspring, she is obliged to quit the eggs she has laid for a second brood, and the prime of the season is lost. Every summer, immediately after the first flight, the nests should be all cleaned out, and the dung totally taken away, as it breeds filth. But remember to do this business early in the morning. The remaining eggs ought likewise to be destroyed, and a perfectly clean habitation made for the harvest flight of these birds. It is directed never to go into a dove-cote later than mid-day, but as early in a morning as convenient. Whatever repairs are necessary, either to the building or to the nests, should be done before noon; for if you disturb the pigeons in the afternoon, they will not rest contentedly the whole night; and the greatest part perhaps will not enter the cote until the next day, but will sit moping on the ground; and if in breeding time, either a number of eggs may be spoiled, or several young ones starved to death. It is added, that pigeons are supposed to be more productive from the breeds being crossed; in proof of which, a few tame pigeons were put into a dove-cote; and the consequence was, that a more early, and a more numerous hatch of young were produced than in any of the neighbouring cotes at the same season. It is also farther stated that these birds have a great antipathy to owls, which find their way sometimes into dove-cotes; and there is no getting rid of such troublesome guests but by destroying them. Rats are terrible enemies to pigeons, and will soon destroy a whole dove-cote. Cats, weasels, and squirrels will do the same. It will be necessary, therefore, to examine the dove-cote once every week at least, very minutely, to see that there are none of these intruders in the houses where they are kept.

In some cases, in order to catch and destroy pigeons, where they become troublesome to the farmer, it has been directed to take a good number of small twigs, and bird-line them well, laying them on the ground where pigeons, &c. frequent, and they will soon be entangled with them; and, in order to allure them to the twigs, two or three pigeons may be tied to the ground, among the twigs. And another mode is to cut some sheets of thick brown paper, each into about eight parts, making them up into the shape of a sugar-loaf, and bird-liming the inside of them three or four days before intending to use them; putting into each paper, near the bottom, three or four grains of corn, and laying these papers up and down the ground, as much

as you can, under clods of earth, early in the morning before the pigeons, &c. come to feed. When the pigeons come to feed on the corn, by thrusting in their heads to reach it, they get hood-winked by the paper flicking to their heads, which occasions them to take wing, and fly upright till they have spent themselves, when they tumble down and may be easily taken. But the gun is probably the best method in such instances.

PIGEON, *Barbary*. See BARB.

PIGEON, *Helmet*. See HELMET.

PIGEON, *Laughing*. See LAUGHER.

PIGEON, *Mahomet*. See MAHOMET.

PIGEON-Dung, in *Agriculture*, a manure of the bird dung kind, which is supposed to possess many valuable properties. It is sometimes turned in like other light substances in the spring, and costs about one shilling a bushel, heaped, in some districts, and about a halfpenny a bushel more bringing to the land; it is used also as malt dust, and answers in all seasons. See MANURE, and TOP-DRESSINGS.

PIGEON-House, in *Rural Economy*, a building, or house, erected for the purpose of keeping and breeding of pigeons, &c. It is sometimes called a dove-cote. In order to erect a pigeon-house to advantage, it is necessary, in the first place, to pitch upon a convenient situation, of which none is more proper than the middle of a spacious court-yard, when it is sheltered, and has a southern aspect. With regard to the size, it must depend entirely upon the number of birds intended to be kept; but it is better to have it too large than too small; and as to its form, the round should be preferred to the square, because rats cannot so easily come at them in the former as in the latter. It is also much more commodious; as, by means of a ladder turning upon an axis, it is possible to visit all the nests in the house, without the least difficulty; which cannot be so easily done in a house of the square form. And in order to hinder rats from climbing up the outside of it, the wall should be covered with tin plates to a certain height, as about a foot and a half; which should project out three or four inches at the top, to prevent their getting up more effectually. It should be placed at no great distance from water, that the pigeons may carry it to their young ones, in a proper state and more conveniently. Where the house is covered with boards, they should be well joined together, so that no rain may penetrate through. And the whole building should be covered with hard plaster, and white-washed within and without. There must be no window or other opening in the pigeon-house to the eastward; these should always face the south; for pigeons are very fond of the sun, especially in winter. Other coverings are better than boards, as will be seen below. In regard to the nests or covers, they may consist of square holes made in the walls of a sufficient size to admit the cock and hen to stand in them; the first range of these nests being placed at a proper distance from the ground; and these nests should be placed in quincunx order, and not directly over one another. Nests may likewise be formed in other ways, as will be seen below.

It may be noticed that any lord of a manor may build a pigeon-house on his land, but a tenant cannot do it without the lord's licence. And that when persons shoot at or kill pigeons within a certain distance of the pigeon-house, they are liable to pay a forfeiture.

And it has been remarked in a late practical work, that where pigeons are bred for the purpose of deriving profit from them, the pigeon-house should not only be large and roomy, but be placed in such a situation that the pigeons may be fed with convenience, and without being disturbed by the different operations that are constantly going on about

the farm-houfe. The form of the houfe is probably not a matter of much confequence, provided it be not made too deep in the infide; pigeons difliking to have their nefts low down. The floor fhould be clofely laid, and the fides well plaftered, to keep out vermin. The roof may be covered by any convenient and fuitable material, but tiles and flates are by much the beft; thatch, being warm in winter and cool in fummer, may alfo afford a very good covering. The great objection to thatch for dove-cotes is, that the pigeons are apt to fcratch it off; but when the ridge is fecured by ridge-tiles, and very light hurdles are laid on each fide of it, that inconvenience may be prevented. The whole muft be made perfectly fecure againft the entrance of rats and other vermin. Where buildings of this fort are quite detached from the other offices, it is, perhaps, the beft and cheapeft method to erect them on pillars of brick or ftone, or ftroag pofts of wood, about fix or feven feet high from the ground. In the latter cafe the upper parts of the houfe may likewife be principally compofed of wood; and the under part will ferve as a fhed for various ufeful purpofes. If a ftable or cow-houfe the better, as it will have a tendency to keep the pigeons warmer in winter, which is material to their breeding early in the fpring, when they are of moft value in the market. The chief objection againft wood cotes are, their being too cold in the winter, and too hot in the fummer months. It is further ftated, that the apertures or openings for the entrance of the pigeons, fhould always have a fouthern afpect, as they delight in a funny fituation, as obferved above, and they ought not to be too large; the common fize is larger by much than is neceffary. The number of holes muft be regulated by the quantity of birds that are intended to be kept; it is better, however, to have too few than too many; as a great number of holes renders the dove-houfe cold, and in any cafe but few are made ufe of by the pigeons. Above thefe holes a piece of weather boarding, fufficiently large for keeping off the wet, fhould conftantly be fixed up. Thefe boards are generally made fo fmall that they do not keep off the wet effectually from the pigeons. And though it is the general praftice to make fquare holes of board for the pigeons to lay and breed in; a neater method is that of employing fmall wicker baskets open at the top for this purpofe; thefe baskets may either be compofed of finer or coarfer materials according to the inclination of the builder, or the expence he wifhes to be at. Nests made in this way take up but little room, and are readily removed, whenever it is neceffary to clean them, efpecially if they be fixed up in a convenient method for the purpofe. Convenience fhould always be particularly attended to in buildings of this kind.

**PIGEON-Holes**, in *Brick-making*. See **BRICK**.

**PIGEON-Tree**, in *Botany*. See **CYTISUS**.

**PIGEON Creek**, in *Geography*, a river of America, which runs into the Ohio, N. lat. 37° 44'. W. long. 88° 6'.

**PIGEON Houfe**, a name given by Capt. Cook to a mountain of New Zealand, from a fuppofed refemblance. N. lat. 35° 19'. W. long. 209° 42'.

**PIGEON Island**, an ifland in Dufky bay, New Zealand, S. of Facile harbour.—Alfo, a fmall ifland in the bay of Bengal, near the coaft of Cicacole. N. lat. 17° 34'. E. long. 83° 23'.—Alfo, a fmall ifland in the Eaft Indian fea, near the coaft of Canara. N. lat. 14° 2'. E. long. 74° 5'.—Alfo, a fortified ifland in Port Royal bay, Martinico.—Alfo, an ifland near the E. coaft of Ceylon; 10 miles N.N.W. of Trincomaly.

**PIGEON River**, a river of the ftate of Tennessee, which runs into the French Broad river, N. lat. 35° 46'. W. long. 82° 56'.

**PIGER HENRICUS**, flothful Harry, a fantaftical name for a flow diftilling chemical furnace; called alfo an *athanor*.

**PIGGERY**, in *Rural Economy*, a term applied to the place where hogs or fwine are lodged.

In *Plate XL. fig. 1.* on *Agriculture*, is feen the plan of one-half of the duke of Bedford's piggery at Woburn Abbey: *a, a, a, a, a, a*, flies; *b, b, b, b, b, b*, troughs; feperated by ftrips of wood generally into fix divifions, but occasionally into a greater number when the pigs are fmall; *c, c, c, c, c, c*, gates which feperate the flies and fhut them up, as fhewn by the dotted curved lines, when cleaned, &c.; *d, d, d, d, d, d*, gutters which convey the urine and liquid filth into the receptacles *e, e; f*, a boiler for potatoes, meal, &c.; *g, g, g*, chefts for peas, meal, &c. *Fig. 2.* a fection through the dotted line A B. The doors in cold weather are partially clofed by hatches which turn down on hinges; one of them is fhewn in that ftate at *k; l* the boiler. *Fig. 3.* is a fection through the dotted line C D; *m, m*, troughs; *n*, one of the gates; that on the other fide is fuppofed taken off to fhew the door *o; p, p*, gutters. *Fig. 4.* a fection of one of the troughs on a larger fcale; *q, q*, the hatches, as turned up in mild weather.

This form of piggery is very neat and convenient for many different purpofes in the rearing and keeping of fwine. See *Hog-flie* and **SWINE**.

**PIGGIN**, a provincial term applied to a little pail or tub with an erect handle, for milking in, and other ufes. See **PAIL**.

**PIGHIUS, STEPHEN-VINAND**, in *Biography*, a learned antiquary, was born in 1520, at Campen, in Overyffel. He was maternal nephew of Albert Pighius, whose family name he affumed. A refidence of eight years at Rome gave him an accurate knowledge of the remains of antiquity in that capital. On his return to Germany he attached himfelf to cardinal Granvelle, whom he ferved in the character of fecretary for fourteen years, and finally became a canon regular in his own country, and died in 1604. He obtained a high reputation for antiquarian knowledge, and the purity of his Latin ftyle. He compofed two Roman calendars from fragments in the Capitol, and wrote commentaries on the Fafti. He alfo published "Hercules Prodicias," containing the hiftory and travels of Charles, duke of Cleves, propofing it as a kind of model of the education of a young prince. Some pieces of his writing are inferted in the collection of Gronovius. Moreri.

**PIGHTLE**, in *Rural Economy*, a provincial term applied to a fmall inclofure or croft.

**PIGMATHA**, in *Geography*, a town of Ruffia, in the government of Olonetz, on the N. coaft of lake Onerskoe; 16 miles S. of Povenetz.

**PIGMENTS, PIGMENTA**, preparations in a folid form, ufed by painters, dyers, &c. to impart colours to bodies, or to imitate particular colours.

Thefe require to be mixed with fome fluid, as a vehicle, before they can be employed as paints, except in the cafe of crayons, where they are ufed dry.

When glafs is ftained, or coloured, as in painting on glafs, or for counterfeiting gems, or precious ftones, the pigment is always of a metalline, or a mineral nature.

In the gilding of wood, pigments approaching as near as may be to the colour of gold itfelf are both laid under the gold, and ufed alfo for the colouring of deprefsed parts, where gold-leaf cannot be conveniently applied. The fubftance chiefly employed for this purpofe is yellow ochre, the colour of which may be improved by a fmall addition of vermilion or other red powders. See **GILDING**.

**PIGMY, or PYGMY**. See **PYGMY**.

**PIGNATA**,

**PIGNATA**, in *Commerce*, a measure for oil at Naples; 320 pignate being = 16 staja = 1 falma = 325 lb. avoirdupois.

**PIGNE**, in *Geography*, a town of France, in the department of the Maritime Alps, and chief place of a canton, in the district of Monaco; 20 miles N.E. of Nice. The place contains 2285, and the canton 2285 inhabitants, on a territory of 52½ kilometres, in 1 commune.

**PIGNE**, in *Botany*. See **PINEA**.

**PIGNEROLA**, or **PINEROLA**, in *Geography*, a town of France, in the department of the Po, late capital of the province of the Four Vallies in Piedmont, near the Cluson, the key of Italy, and fortified; 16 miles S.W. of Turin.

**PIGNOLETTI**, in *Ichthyology*, a name used by many for the *aphya cobites*, a small fish of the gobioid or sea-gudgeon kind, common in the Mediterranean, and brought to the markets of Rome and Venice. See **Gobioides Minutus**.

**PIGNORIA**, **LORENZO**, in *Biography*, a learned antiquary, was born at Padua in 1591. He was brought up among the Jesuits, and became confessor to a nunnery, and parish priest of St. Lorenzo. A canonry of Treviso was also conferred upon him by cardinal Fr. Barberini. He was in habits of intimacy with many of the most illustrious men of his time, and collected a valuable library and cabinet of antiquities. He died of the plague in 1631. His works are highly esteemed; the chief are, "De servis et eorum apud Veteres Ministeriis;" "Mensa Isiaca," which is an elaborate commentary upon a famous relic, and three Latin letters to the senator Domenico Molino. Moreri.

**PIGRIN**, in *Geography*, a Russian settlement, on the W. coast of America, in Beering's strait. N. lat. 65° 54'. E. long 191° 40'.

**PIGRITIA**, in *Zoology*. See **BRADYPUS Tridactylus**.

**PIGUS**, in *Ichthyology*, the name of a species of leather-mouthed fish, very much approaching to the nature of the carp.

It is of the same shape and size with the common carp, and its eyes, fins, and fleshy palate wholly the same; from the gills to the tail there runs a crooked dotted line; its back and sides are blueish, and its belly reddish; it is covered with large scales, from the middle of every one of which there rises a fine, pellucid, and very sharp prickle.

It is a finer fish than the carp for the table, and is in season in the months of March and April. It is caught in lakes in some parts of Italy, and is mentioned by Pliny, though without a name.

It is a species of cyprinus, according to Artedi, and is distinguished by that author under the name of the cyprinus called *piclo* and *pigus*. He adds, that the tail is forked, and the scales large; and that in spring and autumn there grow out of them white pyramidal prickles, which remain about five or six weeks, and then fall off; the back is of a blackish-blue, and the belly white, with a faint cast of red. It never grows to more than five or six pounds; the flesh is well tasted. It is found in the lakes in the northern nations.

**PIGWAKKET**, in *Geography*, a town of America, in Maine, which runs into the Saco; 5 miles S. of Pigwakket.—Also, a town of America, in Maine; 27 miles N.W. of Portland.

**PIHLAIS**, a town of Sweden, in the government of Wafa; 83 miles S.E. of Wafa.

**PIHTIPUDAS**, a town of Sweden, in the government of Wafa; 105 miles E. of Wafa.

**PIISKER**, in *Ichthyology*, the name of a fish of the mustela kind, usually called the *mustela fossilis*, or *pisces fossilis*, the fossil fish. See **COBITIS Fossilis**.

This seems very much of the kind of the fishum fish, and possibly is no other than the same species; and possibly also the *pæcilia* of Schonefeldt is the same.

**PIKE**, an offensive weapon, consisting of a shaft of wood, twelve or fourteen feet long; headed with a flat-pointed steel, called the *spear*. The general length fixed for the pike by most princes and states was, according to sir James Turner, in his "Pallas Armata," written in 1670 and 1671, 18 feet; but he observes that few exceeded 15.

The name pike is said to be derived from a bird called by the French *pie*, by us wood-pecker; whose bill is said to be so sharp as to pierce wood like an auger. Du Cange derives it from the base Latin *pica*, or *picca*; which Turnebus supposes to have been so called, *quasi spica*, because resembling an ear of corn: Octavio Ferraro derives it à *spicula*. M. Fauchet says, it was the pike that gave name to the Picards, and to Picardy; which he will have to be modern, and to have been framed on occasion of that people's renewing the use of the pike; the etymology whereof he fetches from the French *piquer*, to prick. But others will have the name *Picard* to have been given that people by reason of their readiness to pick quarrels; called in French *piques*.

The pike was a long time in use in the infantry, to enable them to sustain the attack of the cavalry; but it is now taken from them, and the bayonet, which is fixed to the muzzle of the firelock, is substituted in its place.

It is still used by some officers of infantry under the name of *spontoon*.

Pliny says, the Lacedæmonians were the inventors of the pike. The Macedonian phalanx was evidently a battalion of pike-men.

Father Daniel says, that pikes are not mentioned in the histories of France before the reign of Lewis XI. Pikes were introduced into France by the Switzers. The use of the pike was abolished in France by a royal ordonnance, issued in the year 1703; and though the exact period when pikes were laid aside in England has not been ascertained, it appears by the "Gentleman's Dictionary," published in 1705, that the alteration of the pike for the musket must have taken place some time between the years 1690 and 1705.

**PIKE, Half**, in the *Military Art*, is the weapon carried by an officer of foot. It differs from a pike, because it is but eight or nine feet long, and the spear is smaller and narrower. See **SPONTOON**.

**PIKE**, in *Ichthyology*, a name given by us to the fish called by authors the *lucius* and *esox*, and by the old Greek writers *oxyrinchus*. See **ESOX Lucius**.

It is said, that the pike was introduced into England in the reign of Henry VIII. in 1537, when a pike was sold for double the price of a house-lamb in February. Besides fish and frogs, which are its usual food, it will devour the water-rat and young ducks. It is very fierce and voracious. This fish is very remarkable for its longevity: we read of one that was ninety years old, and of another, that was not less than 267 years old. See *Feeding of Fish, Pike-Fishing*, and **HUXING**.

**PIKE, Land**. See **LUCIUS Terrestris**.

**PIKE-Pearch**. See **LUCIO-perca**.

**PIKE, Sea**. See **MERLUCIUS** and **SUDIS**.

**PIKE**, a provincial word signifying a sort of tacket or load cock of hay, &c.

**PIKE**, a name given in some counties to a prong, or what is generally called a fork, used for carrying straw, &c. from the barn, cocking of hay, &c.

**PIKE**, a term in the midland districts signifying to glean.

fering in several other particulars. It is a species of *CLUPEA*; which see.

The distinguishing characters of it are these: the body of the pilchard is less compressed than that of the herring, being thicker and rounder; the nose is shorter in proportion, and turns up; the under jaw is shorter; the back is more elevated; the belly less sharp; the dorsal fin of the pilchard is placed exactly in the centre of gravity, so that when taken up by it, the body preserves an equilibrium, whereas that of the herring dips at the head; the scales of the pilchard adhere very closely, whereas those of the herring very easily drop off. Pennant.

It is generally found swimming in vast shoals, and is caught in many parts of the English shores. Its flesh is better tasted than that of the herring. See *Pilchard FISHERY*.

**PILCHOWITZ**, in *Geography*, a town of Silesia, in the principality of Oppeln; 36 miles S.E. of Oppeln. N. lat.  $50^{\circ} 10'$ . E. long.  $18^{\circ} 30'$ .

**PILCO MAYO**, a town of Peru; 25 miles N.E. of Potosi.—Also, a river of South America, which, after a south-east course of about 600 miles, runs into the Parana, by two mouths, between S. lat.  $25^{\circ} 40'$  and  $26^{\circ} 20'$ .

**PILE**, in *Antiquity*, a pyramid built of wood, whereon were laid the bodies of the deceased, to be burnt.

**PILES**, in *Hydraulic Architecture*, are beams of timber, or stakes of wood, driven firmly into the ground, for various purposes; as, for forming a first foundation for buildings, piers of bridges, &c.; in which cases they are driven quite down into the ground, or are cut off level with its surface, with a view of obtaining a solid bearing for the weight of the structure which is to be raised.

Amsterdam, and some other cities, are wholly built upon piles. The stoppage of the breach in the banks of the Thames at Dagenham, was effected by dove-tail piles; that is, by piles mortised into one another by a dove-tail joint.

Piles are not employed for foundations unless the ground is suspected to be unfound, or when the weight to be borne is exceedingly great. They act to make the foundation solid, by reaching deep into the earth, down to a more substantial stratum than that of the surface. Indeed, the manner of fixing the piles, by driving them by repeated blows of a powerful machine till they will go no farther, ensures that they come to a good bearing. There are instances of piles being driven down twenty-five feet, before they were thought sufficiently firm.

Piles are also used for making the faces of wharfs, banks of rivers, piers for the sea, &c. For these purposes they are driven in rows, but only a sufficient depth in the earth to make them stand firm, and support the planking or framing which is fixed against them. These piles are usually driven rather in an inclined position. For temporary defence against the water, in laying the foundation of bridges, &c. piles are always required. They are employed in different ways to form an enclosure, or water-tight wall, called a coffer-dam, round the area where the work is to be laid, and from which space the water is drawn by pumps. This is the most difficult of all kinds of piling; because it must stand a great height above the ground, have sufficient strength to resist the pressure of water, and be perfectly close and tight. In navigable rivers detached piles are driven, and very firmly fixed, to mark the enclosures where barges are to lay, and to tender off others from them, as well as to moor them to.

Piles are in general formed of a square timber, tapering if the tree happens to be so, cut to a sharp point at one end, and shod with iron to enter the ground. The other end was bound by a strong iron hoop, to prevent the pile head split-

ing by the violence of the blows which drive it down. When they are to be driven quite below ground, small trees, if sufficiently straight, may be used without squaring; but for coffer-dams square piles are always used, except that for filling up a row between such square piles. When they are to touch each other, flat ones, called pile planks, are used; they are three or four inches thick, according to the depth of water, and have grooves formed in their adjacent edges, to receive tongues or slips of wood, which make the joints quite tight. To enclose an area for a coffer-dam, two rows or walls of piles are usually driven one within the other, at a distance usually equal to the depth of water they are driven in, or if the current is rapid, once and a half. The space between these is filled with clay, so as to form a mound or rampart of clay, defended on the outside and inside by wooden walls of piles. To make these walls, large square piles are first driven at a distance of ten or twelve feet asunder, in the line of the intended range of the dam; horizontal tie beams are then extended from one pile to the next, on the inside, each tie being notched into the piles, so that its outer edge is in a line with the inside of the groove for the plank piles, which are to be driven down to fill up the spaces between the piles, and will be guided by these ties to stand exactly vertical, and in a straight line. The first plank piles are begun to be fixed adjacent to the main piles, and thus they proceed from both ends of the space between the piles, till the planks meet in the centre, where the last plank is inserted, and being formed rather wedge-like, makes all the rest tight. The pile planks are cut inclined, or wedge-like on one side only, to form the point, by which means the point is the line of one of the edges of the plank. When a plank pile is to be driven adjacent to another, this edge is applied to the one already fixed, and then as it is driven, the inclined or wedge-like edge entering the ground, causes the pile to approach, and press very close to its neighbour, and it is chiefly by this means they are made to fit water-tight. The fillets are made by spiking a ledge or ruler of wood fast upon the edge of one plank, and a groove of corresponding depth and width is ploughed in the edge of the adjacent plank to receive it. Many different machines are used to drive piles into the ground; some of them are worked by a great number of men, who raise a heavy weight a small height, and let it fall upon the pile, till, by reiterated blows, they drive it to the required depth. The machine employed is extremely simple. A long thick plank of wood is fixed up close to the pile, having a mortise through the upper end, in which a pulley is fitted; a rope goes over this to suspend the rammer, which is a large block of hard wood, properly hooped, to prevent it from splitting. In rising and falling, it slides against the face of the plank, and is guided by irons, which are fixed to the ram, and are bent round the edges of the plank in the manner of hooks. The plank, when placed upright, is secured by guy ropes, in the manner of the mast of a ship; the end of the great rope which suspends the ram, has ten or twelve small ropes spliced into it, for as many men to take hold, and work it by; they raise the ram up two or three feet by pulling the ropes all together, and then letting them go, the ram falls upon the pile head. When the pile becomes firm enough to cause the ram to rebound, they take care to pull the ropes instantly after the blow, that they may avail themselves of the leap it makes.

This is the simplest form of the machine. Others, instead of a plank, have two upright beams attached together, at such a distance asunder, as to leave an opening between them, for the reception of a piece of wood which is affixed to the ram, and by this means it is guided. Instead of guy ropes, these

these are usually fixed upon a base, consisting of a triangular frame, upon one angle of which the uprights are erected; and from the other two angles, braces arise, which are so inclined as to reach the uprights at half or two-thirds of their height to steady them. This plan is very convenient for driving piles in corners; but for driving rows, it is more advantageous to have the uprights fixed at the middle of one side of the triangular base, and have stays from all the three angles. A machine of this kind, with a ram of beech four feet long and one foot square, may be worked by ten or twelve men, at the rate of twenty-four blows *per* minute, and fixes the pile very quickly.

To estimate the force of the rammer made use of to drive piles, its weight ought to be multiplied into the velocity it acquires in falling. Thus, if a rammer which weighs 500lb. be let fall from four feet, it will fall that height in half a second, and have at the time of percussion a velocity capable to carry it uniformly eight feet in half a second, without any farther help from gravity; so that we must multiply 500 by 16, or its weight by the number of feet it would fall in a second, and the product 8000 gives the momentum of the stroke. If a capstan, pulleys, or windlafs, be made to raise the rammer to a considerable height, and then, by an easy contrivance, loosen it at once from its hook, the momentum of the stroke will always be as the square root of the height from which the rammer fell.

Notwithstanding the momentum, or force of a body in motion, is as the weight multiplied by the velocity, or simply as its velocity, when the weight is given or constant; yet the effect of the blow will be nearly as the square of that velocity; the effect being the quantity the pile is driven into the ground by the stroke. For the force of the blow, which is transferred to the pile, being destroyed in some certain definite time by the friction of the part which is within the earth, which is nearly a constant quantity, and the spaces in constant forces being as the squares of the velocities; therefore, the effects which are those spaces sunk, are nearly as the square of the velocities, or, which is the same thing, nearly as the heights fallen by the ram or hammer to the head of the pile. See upon this subject Leopold, Beldor, also Defaguliers's Exper. Philos. vol. i. p. 336, and vol. ii. p. 417, and Philos. Trans. 1779, p. 120.

For large works, such as bridges, &c., the piles are driven by a different kind of machine: this has a very heavy iron ram, with mechanical powers, by which it is raised to a considerable height, and then let fall, instead of continually repeating small blows. These are sometimes worked by horses, or steam-engines: see elevations of one, in *figs.* 1. and 2, *Plate XXXV. Mechanics.* A, A, are the uprights, erected on the frame B, and supported by the braces C; they are connected by the cross feet *a* at bottom, and the piece D at top; in this the pulley *b* for the rope *d* is fitted. Fillets of iron are fixed within the uprights A, A, and enter grooves made in the edges of the great iron ram E, which is thereby guided as it rises and falls: F is a piece, called the follower, (see *figs.* 3 and 4.) it is a wooden block, sliding between the uprights, and mortised to receive the iron tongs *e*, which take hold of an eye upon the top of the cast iron ram: the rope is attached to the follower by an iron loop *f*, through which the centre pin of the tongs passes. On the base, *a* B, of the machine an iron frame is bolted, to contain the windlafs G, on which the rope *d* winds. On the end of the windlafs a cog-wheel, *g*, is fixed, and a pinion upon the axis, *h*, engages its teeth. Motion is given to the spindle *k* by the winches *k*, fixed on each end of it, and the fly-wheel, *l*, regulates its motion, when turned by two men at each handle. The pile is of course included in the space between the two

uprights, A, A, before it is driven down; and the ram, being engaged by the tongs *e*, is drawn up by turning the handle, *k*, till the tails, *n*, of the tongs come to the inclined planes *m*, *fig.* 1: by these they are closed together, which opens the lower ends, disengages them from the eye of the ram, and it falls upon the head of the pile immediately. The men at the handles shift the spindle *b* endways, which disunites the pinion from the wheel, and then the weight of the follower, F, runs back the windlafs G, and descends till its tongs take hold of the ram, ready to take it up again. The inclined planes, *m*, are not fixed to the uprights A, A, but are connected together by pieces of wood, which embrace the uprights, and these have holes through them to receive iron bolts, which also pass through the uprights. By this means the inclined planes can be shifted, to set them at any required height, that they may, by discharging the ram at the proper height, give a blow proportioned to the pile which is to be driven by it. The tongs are sometimes made with rollers in the ends *n, n*, as shewn in *fig.* 12, that they may act more easily in the inclined planes. Other machines have a kind of latch, shewn in *fig.* 11, instead of the tongs; in this *f* represents the iron loop for the rope; the centre pin of it passes through the latch *r s t*, which catches the eye of the ram by the hook *t*, and is discharged by the line *r*, when the men snatch it. The weight *s* is to cause the hook to catch; the loop *f* is attached to a wooden follower, which guides it between the uprights.

Machines of this kind are frequently actuated by steam-engines. A pulley, which is fixed on the end of the spindle *b*, in place of the handle *k*, receives an endless rope from some wheel put in motion by the engine; one man then attends it, to throw the spindle endways at the proper time, to permit the descent of the follower; but we have seen one in which levers, and a connecting rod from the inclined plane, *m*, were used to disengage the spindle the moment after the follower discharges the ram; by adopting these means much expence of labour would be saved, as the same steam-engine which is afterwards to be employed in pumping out the water of the coffer-dams, would drive the piles for them and the foundations.

The piles of the works of Westminster-bridge, whilst it was building, were driven by a horse-machine invented by Mr. Valoué. A pair of the uprights, such as represented at *figs.* 1 and 2, but thirty feet high, were erected at one end of a frame, which supported a vertical shaft, turned round by the horses, and the framing was of course large enough to admit a circular walk of sufficient size for them to work in, when they drew the ends of arms or levers projecting from the vertical shaft. The whole was erected upon a platform, which was built over a barge in the manner of a deck. The vertical shaft had a wheel or drum upon it, to wind up the rope of the follower, and it was in the construction of this part that the invention lay. A section of the upper part of the vertical shaft and drum is given in *fig.* 8. and a plan in *fig.* 9. Here A is the great upright shaft, or axle, turned by the horses attached to the levers, which are not shewn. The cog-wheel, B, turns the pinion X, having a fly, O, at the top to regulate the motion, and to act against the horses, and keep them from falling, when the heavy ram is disengaged to drive the pile down into the earth in the bottom of the river. The drum, C, is loose upon the axle of the shaft A, but is locked to the wheel, B, by the bolt Y. On this drum the great rope, H, is wound, one end of it being fixed to the drum, and the other to the follower, passing over proper pulleys. In the follower are contained the tongs, which take hold of the ram, by the staple for drawing it up, in the same manner as described in *fig.* 2;

## PILE.

D is a spiral, or fusee fixed to the drum C, on which winds the small rope T; it goes over a pulley, and has a small counterpoise hung to the end of it, which hinders the follower from accelerating as it goes down to take hold of the ram; for as the follower tends to acquire velocity in its descent, the line, T, winds downwards upon the fusee on a larger and larger radius, by which means the counterpoise acts stronger and stronger against it; and so allows it to come down with only a moderate and uniform velocity. The bolt, Y, locks the drum to the great wheel, being pushed upwards by the small lever 3, which passes through a mortise on the shaft A, and turns upon a pin; the lower end of the bolt is guided by passing through a piece of wood, 6, fixed into the great shaft, and the upper passes through an arm of the wheel; the lever, 3, has a weight, 4, which always tends to push up the bolt, Y, through the wheel into the drum; G L is the great lever, turning on the centre m, and resting its end, G, upon the forcing bar 5, which goes down through a hollow in the shaft A, and bears upon the little lever 3. The other end of the lever, L, is long enough to reach to the uprights, and has there a small rope, extended from the end of it up to the inclined planes, so that the follower, when drawn up to the highest, draws this rope, and raises the long end, L, of the lever, depressing the other, and the forcing bar 5. By the horses going round, the great rope, H, is wound about the drum C, and the ram is drawn up by the tongs in the follower, till they come between the inclined planes, which, by shutting the tongs at the top, open them below, and so discharge the ram, which falls down between the uprights upon the pile, and drives it by a few strokes as far into the ground as it can go, or as is desired; after which the top part is sawed off close to the mud, by an engine for that purpose. Immediately after the ram is discharged, a piece upon the follower takes hold of the rope, which raises the end, L, of the lever L G, and cause its end, G, to descend, and press down the forcing-bar, 5, upon the little lever, 3, which by drawing down the bolt Y, unlocks the drum, C, from the great wheel B; and then the follower being at liberty, comes down by its own weight to the ram; and the lower ends of the tongs slip over the eye of the ram, the weight of their heads causing them to fall outwards, and fasten upon it; then the weight, 4, pushes up the bolt, Y, into the drum, which locks it to the great wheel, and so the ram is drawn up as before.

As the follower comes down, it causes the drum, C, to turn backward, and unwinds the rope from it, while the horses, the great wheel, pinion X, and fly, go on with an uninterrupted motion; and as the drum is turning backward, the counterpoise is drawn up by its rope, T, winding upon the spiral fusee D.

There are several holes in the under side of the drum, and the bolt, Y, always takes the first one that it finds, when the drum stops by the falling of the follower upon the ram, till which stoppage the bolt has not time to slip into any of the holes. But the same effect is more certainly produced by a crooked lever, *t*, *fig. 9*, fixed on the framing R, over the end of the vertical shaft; one end of this has a roller, which is pressed upon by the great rope, H, the other end holds down the catch, 5, of the forcing-bar, but as soon as the great rope slackens, it retires, and gives liberty to the small lever, 3, to push up the bolt. As long as the great rope has a tension upon it, to support the weight of the ram or follower, the crooked lever is kept in close contact with the forcing-bar, and when that is depressed, (to discharge the bolt Y,) by locking over its catch, 5, the crooked lever keeps it down, till the follower touches the

ram; the great rope then slackens, and the spring, *v* H, discharges the crooked lever from the catch of the forcing bar, and gives liberty to the small lever, 4, to push up the great bolt, and to lock the drum to the great wheel, and the ram is drawn up again as before.

The peculiar advantages of this engine are, that the weight of the ram, or hammer, may be raised with the force of horses instead of men; that when it is raised to a proper height, it readily disengages itself, and falls with the utmost freedom; that the forceps or tongs are lowered down speedily, and instantly of themselves again lay hold of the ram, and lift it up; on which account this machine will drive the greatest number of piles in the least time, and with the fewest labourers.

The piles at Westminster bridge, when driven by the above machine till they were quite firm, were cut off, under water, by a machine, to be level with the surface of the ground to found the piers upon. This machine consisted of a framing which was adapted to sit upon the upper part of the pile, and could be fixed fast thereto. The lower part of this frame formed guides for the saw, which reciprocated horizontally at a certain depth beneath the top of the pile, and had weights to cause it to advance up to the cut. The saw was put in motion by ropes from each end, which were conducted, over proper pulleys, to two men standing on a float or raft at the surface. After fixing the machine, before the sawing was begun, the whole machine was suspended by a tackle, which therefore took up the top part of the pile with the machine as soon as it was cut off. This was the invention of Mr. Etheridge, carpenter to the works at Westminster bridge; it was very effective, as the time employed in cutting off a fir pile of 14 or 16 inches square, in ten feet depth of water, was seldom more, and often less, than a minute and a half. A machine, more convenient than this in its application, and not less effective, has been since invented by Mr. Foulds, to whom the Society of Arts presented a gold medal for the invention; see *figs. 5* and *7*. A A B is the external frame, consisting of four parallel rails A, framed into two others, B, at right angles, with proper cross pieces to unite them, and inclined to strengthen the whole; within this frame a second, or internal frame, D E, is situated; like the other, it has four parallel pieces, D and E, connected together into one frame by cross pieces; at the top it has two pieces *a, a*, which rest upon the beam B, and suspend its weight, and on these it is capable of sliding backwards and forwards between B B, always preserving its parallelism, because it is moved by the racks, *d, d*, affixed to it, one at top, and the other at the bottom; the pinions for both are fixed on a vertical axis *e*, supported in the external frame; therefore, by turning the handle *r*, the internal frame with the saw is advanced to the pile, as at K, *fig. 6*. The saw itself is sustained in a frame L, *fig. 7*, which fits, in the manner of a sash frame, between the two beams, D, of the internal frame, and has racks, *f, f*, (dotted) behind it, which work in pinions on an axis *g*, extended across the frame, and by the handle, *y*, of this it is capable of being drawn up and let down, or detained at any height by a ratchet-wheel and click *x*; the saw, *m*, is fixed upon a spindle N, supported in bearings on the frame L, and turned by the handle, R, at the top; the saw is connected with the spindle by a piece of iron *p*, having a mortise through it for the reception of the spindle, to which it is fastened by a nut beneath: by this means the saw's edge may be advanced as the work goes on.

In using this machine, the beams, B, are fixed across a barge, which is ballasted till they are horizontal, and the spindle of the saw is therefore vertical in this state; it is moored with her side against the pile, K, to be cut off, as

shewn by the dotted line V, *fig. 6*; then by the rack and pinion *f, g*, the saw is adjoined in height to the level where the pile is to be cut; by the handle *r* it is advanced to the pile K, whilst by the other handle, R, the saw is kept in continual motion backwards and forwards, till the pile is cut through, and the piece is taken into the barge, which proceeds to cut off the next by the same means. By this machine temporary piles, which are used in coffer-dams, may be cut off level with the bottom, when the work is finished, which is a very superior method to drawing them up out of the ground, as is the usual practice, because this must necessarily make a deep ditch or trench all round the pier or foundation, and tend to loosen the ground. To draw piles out of the ground when they have been driven fast, requires a very great force. There are different methods of exerting this force: one for drawing them in water, is by having a very strong barge, with a windlass at one end to receive a strong chain, which is passed several times round the head of the pile, and made fast to the barge; two long beams are laid upon the barge to form a railway for a small waggon to run upon from one end of the barge to the other, and it is loaded with stones of several tons weight; when this is wheeled to one end of the barge, it will of course depress it in the water, elevating the other; then, in this state, the lowest end of the barge is chained to the pile by putting a very large bolt through it, and passing a chain round the pile under this bolt a great many times; the carriage is then wheeled to the other end of the barge by a windlass and rope; this tends to raise the end to which the pile is fixed; and when the carriage is so far advanced that it exerts a sufficient power, it will draw up the pile if the chain is properly fixed: the carriage is now returned to draw another pile.

A plan has been adopted at the new bridge now building across the Thames at the Strand, for drawing the useless piles by one of Mr. Bramah's hydrostatic cylinders. This is represented in *fig. 10*, where A is supposed to be the top of a range of piles forming the coffer-dam, and B the pile which is to be drawn. A chain, *a*, is made fast to the pile, and carried many times round a large beam CD, the end, D, of which rests upon a fulcrum, or support E, consisting of a block, supported on the head of a neighbouring pile, &c. F is a block of wood, screwed together in two places, and inclosing between them a cast iron cylinder *b*, into which is fitted the piston, or cylinder *d*, the joining being made tight by a collar of leather; *e* is a small copper pipe, communicating with the cylinder, and also with a small forcing pump, the piston, *f*, of which, is actuated by the lever *g b*; the pump is fixed upon the top of a small cistern, *k*, to contain water. Now by working the lever of the pump, water is injected into the cylinder *b*, and protrudes the piston, *d*, from it with a force proportioned to the force exerted upon the lever, in the same degree as the areas of the pump to that of the cylinder multiplied by the proportions of the lever *b*. (See this principle more fully illustrated under MACHINERY, and PRESS, *Hydrostatic*.) By this means the power of one or two men is increased to such a degree, as to draw up the largest pile; the copper pipe, *e*, is made to unscrew at several joints, which are provided with leather, to make them tight; by this means the pump is separated when the machine is to be removed. As it has no connection with the beam or lever D, the cylinder is frequently employed in the manner of a hand jack, for any purposes where enormous weights are to be lifted for a small space; the collars of leather are the same as are used in the presses. The same figure also shews a very complete way of catching fast hold of the pile, instead of putting a bolt through the pile head

to stop the chain under: it is simply a strong iron ring, *l*, large enough to drop over the pile loosely, and having a strong shank or eye, *m*, projecting from it to run the chain through; and when this is drawn, the ring jams so forcibly upon the wood of the pile, as to draw it out of the ground rather than slip off, for it holds faster in proportion to the force.

The theory of Mr. Valoue's engine depends on the following principles, *viz.* 1. If the resistance of the ground, and the masses of the piles be equal, the depths to which they will be driven with a single blow will be as the product of the weight of the ram into the height through which it falls.

2. If the masses of the ram, and heights through which it falls are both equal, the depths to which the piles will be driven, will be in the inverse ratios of the masses of the piles into the superficies of that part of them which is already immersed in the earth.

3. If all these things be unequal, the depths will be in a ratio compounded of the direct ratio of the heights through which the ram falls into its mass, and the inverse ratio of the mass of the pile into its immersed superficies.

4. If the weights of the ram be equal, and also the weights of the piles, the depths to which they will be driven will be as the heights through which the ram falls directly, and the immersed superficies of the piles. Or, because the immersed superficies of the piles are as the depths through which they are already driven into the earth, these depths are simply as the square roots of the heights through which the ram falls.

These principles are founded on the general supposition that the space through which the weight falls is estimated by the product of its mass into the square of its velocity, or into the height through which it falls.

Hence it is inferred, that the distance through which a pile will be driven by each succeeding blow will be less and less, as the superficies of that part of the pile which is immersed in the ground increases; and, consequently, that there is a certain depth, beyond which a pile of a given mass and scantling cannot be driven; the mass of the ram and the height through which it falls at first being assigned. It appears also, that the loading the pile with weights, and thereby increasing its mass, will be so far from accelerating its descent, that it will absolutely retard it. See some curious observations on the structure and operation of this engine by Mr. Bugge, professor of astronomy and mathematics in the academy of Copenhagen, &c. in the *Phil. Trans.* for 1779, vol. lxix. part i. art. 12.

PILE is also used, among *Architects*, for a mass or body of building.

PILE, in *Artillery*, denotes a collection or heap of shot or shells, which are usually piled up by horizontal courses into a pyramidal form, the base being either an equilateral triangle, a square, or a rectangle. In the triangle and square, the pile terminates in a single ball; but in a rectangle, in a single row of balls. In the triangle and square piles, the number of horizontal rows, or the number counted on one of the angles from the bottom to the top, is always equal to the number counted on one side, in the bottom row. In triangular piles, each horizontal course is a triangular number, produced by taking the successive sums of the numbers 1 and 2; 1, 2, and 3; 1, 2, 3, and 4, &c.; and the number of shot in a triangular pile is the sum of all the triangular numbers taken as far, or to as many terms, as the number in one side of the bottom course. In order to obtain the number in a triangular pile, count the number in the bottom row, and multiply that number more two by that number

more one; and the product multiplied by one-sixth of the said number will be the whole sum required.

In square piles, each horizontal course is a square number, produced by taking the square of the number in its side; and the number of shot in a square pile is the sum of all the squares, taken from one as far as the number in the sides of the bottom course. To find the number, count the number in one side of the bottom course; to that number add one, and to its double add one; multiply the two sums together, then their product being multiplied by one-sixth of the said number, will give the required number of shot in the pile.

From the exemplification of these rules, it would appear, that when room is wanted, it is most convenient to flow the shot in triangular piles; for on the equilateral triangle, which is less than half the area of a square of one of its sides, there can be piled a greater number than half of those that can be raised on the square: and the height of a square pile is somewhat less than that of a triangular one; because a shot will sink lower in the space between four others, than between three others, when they are of equal diameter.

In rectangular piles, each horizontal course is a rectangle, the upper one being one row of balls; and every such oblong pile may be considered as consisting of two parts, one a square pyramid, and the other a triangular prism. To find the number of shot in a rectangular pile, take the difference between the number in length and breadth, in the bottom course; multiply the number in breadth, more one, by half the breadth; the product multiplied by the said difference will give the number in the prismatic pile; upon the square of the breadth, find the number in a pyramidal pile; and the sum of these two piles will give the number required. See CALIBER.

To PILE Arms, in *Military Language*, is to place three muskets with fixed bayonets in such a position with regard to one another, that the butts shall remain firm in the ground, and the muzzles lie close together in an oblique direction. This method has been adopted to prevent the injury which was formerly done to musketry, when the custom of grounding the firelock prevailed. Every recruit should be taught how to pile arms before he is dismissed the drill.

PILE, *Pila*, in *Coinage*, denotes a kind of puncheon, which, in the old way of coining, with the hammer, contained the arms, crosses, or other figure and inscription, to be struck for the reverse of the species.

Accordingly, we still call the arms-side of a piece of money the *pile*, and the head the *cross*; because, in the ancient monies, a cross usually took the place of the head in our's.

Hence also the game of *cross* and *pile*.

Some will have it called *pila*, *pila*, because on this side, in our ancient coins, there was an impression of a church built on piles. Scaliger, with more probability, derives it from the old French word *pila*, a *ship*. Vide prima Scaligerana, in voc. Nummus Raticus, p. 115.

In some ancient writings, *pila* is used to signify the particular figure, or impression of money. Thus Fleta: he who brings an appeal of robbery, or theft, against another, must shew the certain quantity, quality, price, weight, number, measures, value, and pile.

PILE, in *Heraldry*, is an ordinary, in form of a point inverted, or a stake sharpened; contracting from the chief, and terminating in a point towards the bottom of the shield, somewhat in manner of a wedge.

It is formed, probably, in imitation of the Roman pilum, which was a tapering dart, about five feet long, and sharpened at the point with steel.

The pile is borne inverted, engrailed, &c. like other ordinaries; and issues indifferently from any point of the verge of the escutcheon. He beareth a pile gules, by the name of Chandois.

PILE, in *Rural Economy*, a sharpened piece of wood driven down into the ground, to protect the banks of rivers, or other similar purposes. It should be strong, and well driven in. See PILE, *supra*.

PILE, a provincial word applied to the breaking off the awns of threshed barley.

PILE of *Grass*, a blade or small bit of grass.

PILE-Planks, are planks whose ends are sharpened, to drive into any canal or water, close to each other, in order to form a flank, by which the water may be stopped and discharged. See *Plate IV. Canals, fig. 30.*

PILE-Sheating is the same with *dove-tail piling*.

PILE-Worms, are a kind of worms found in the piles of the sea-dikes in Holland. These worms are of various sizes: some of the young ones are not above an inch or two in length; but others have been found thirteen or fourteen inches long.

The heads of these creatures were covered with two hard shells or hemierania, which together form a figure resembling an auger, and with which they bore the wood. The best remedy against them is, to perforate the piles with many small holes, about an inch asunder; then it must be done over with a varnish in the hottest sun; and while the varnish is hot, brick-dust must be strewn over it; and this being several times repeated, the pile will be covered with a strong crust, impenetrable to all insects. See a farther account of these creatures in *Phil. Trans. N° 455, sect. 5.*

PILEÆ, a name given by some authors to a genus of echinodermata.

PILENTUM, among the Romans, an easy kind of chariot, used by the Roman ladies at games and religious processions.

PILES, in *Surgery*. See HEMORRHOIDS.

PILES, *Liniment for the*. See LINIMENT.

PILESGROVE, in *Geography*, a town of America, in New Jersey, and county of Salem, containing 1756 inhabitants.

PILETTUS, in our *Ancient Forest Laws*, an arrow which had a round knob a little above the head, to hinder it from going far into the mark.

From the Latin *pila*, which signifies any round thing like a ball. "Et quod forestarii sui non portabunt sagittas barbatus, sed pilettos." Charta Rogeri de Quincy.

PILEUS, in *Roman Antiquity*, was the ordinary cap or hat worn at public shows and sacrifices, and by the freed-men.

It was one of the common rewards assigned to such gladiators as were slaves, in token of their obtaining their freedom. See RUDIS.

PILEUS *Presbyteri*, in *Botany*, a name given by some writers to the euonymus or fufanus, a shrub which grows in our hedges, and bears a square fruit, somewhat resembling the cap worn by some orders of priests.

PILEWORT. See RANUNCULUS.

PILFUNTE, in *Geography*, a town of Abasica, on the Black sea; 16 miles S.S.W. of Anakopia.

PILGERRUN, or PILGRIM'S Rest, a Moravian town of Pennsylvania; 140 miles N.W. of Pittsburg.

PILGRAM, or PELDRZIMOW, a town of Bohemia, in the circle of Bechin. N. lat. 49° 28'. E. long. 15° 7'.

PILGRIM, one who travels through foreign countries to visit holy places, and to pay his devotion to the relics of dead saints.

The word is formed from the Flemish *pelgrim*, or Italian *pelegrino*, which signifies the fame; and these originally from the Latin *peregrinus*, a *stranger*, or *traveller*.

The humour of going on pilgrimage anciently prevailed exceedingly, particularly about the time of the croisades. Pilgrimages were most in vogue after the end of the eleventh century, when every one was for visiting places of devotion, not excepting kings and princes themselves; and even bishops made no difficulty of being absent from their churches on the same account. The places most visited were Jerusalem, Rome, Compostella, and Tours; but the greatest numbers resorted to Loretto, in order to visit the chamber of the blessed Virgin, in which she was born, and brought up her son Jesus, till he was twelve years of age.

This chamber, it is pretended, was carried by angels into Dalmatia, about the year 1291, and afterwards in the same manner transported to Loretto, where a magnificent cathedral is built over it. In this chamber is the image of the blessed Virgin, almost covered with pearls and diamonds; and round the statue there is a kind of rainbow, formed of precious stones of various colours. Five hundred thousand pilgrims have sometimes resorted to this house in one year, in order to pay their devotions before this glorious image.

Several of the principal orders of knighthood were established in favour of pilgrims going to the Holy Land, to secure them from the violences and insults of the Saracens and Arabs, &c.

Such were the orders of the knights Templars, the knights Hospitalers, knights of Malta, &c.

The Mahometans are commanded in the Koran (chap. 2, 3, 22.) to perform a pilgrimage to Mecca. This is one of the capital points of their religion, and therefore a prodigious cavalcade of pilgrims annually goes thither, in the company of those who are sent with the grand seignior's presents to the tomb of Mahomet.

So strictly is this duty enjoined, and so necessary is the performance of it, that, according to a tradition of Mahomet, he who dies without performing it may as well die a Jew, or a Christian. For an account of these pilgrimages, see CAABA, CARAVAN, and MECCA.

PILHANNAW, in *Ornithology*, a name given by the Indians to a bird found in the forests, on the back of some of our American plantations.

It is a bird of prey, very large and bold. It is described by Joffelin as four times as big as our goshawk, and having a remarkable large head. All the birds are terrified at its approach; but it principally feeds on quadrupeds, as young fawns, and the like.

PILIATCHIN, in *Geography*, a cape on the east coast of Russia, in the Penzinskoi sea; 272 miles E.N.E. of Ochotk. N. lat. 60° 10'. E. long. 155° 14'.

PILIMICTIO, a word used by several authors to express a discharge of small and long filaments, which resemble hairs, among the urine.

PILING. See PALLIFICATION.

PILING-Iron, a name provincially applied to a tool used in breaking off the awns of barley, and sometimes the tails of oats; an operation which with the farmers is called piling barley, and sometimes faulting it.

PILIO, in *Geography*, a town of Thibet; 67 miles N. of Tourfan Hotun.

PILIS, a town of Hungary; 8 miles S.E. of Gran.

PILKALLEN, a town of Prussian Lithuania; 64 miles E. of Königsberg. N. lat. 54° 45'. E. long. 22° 57'.

PILKOPEN, a town of Prussia, in the province of Szmland, seated on a mountain, where the ancients placed

an idol, called "Pilkob," which they worshipped; 30 miles N. of Königsberg.

PILKINGTON, a township of England, in Lancashire, containing 5786 inhabitants, including 3824 employed in trade and manufactures; 3 miles S. of Bury.

PILL, or CROCKERN *Pill*, a town, or rather village, of England, in the county of Somerset, on a point of land at the mouth of the Avon, where it joins the Severn at King-road, inhabited chiefly by mariners and pilots, who are employed in navigating vessels up the river, and down the Bristol Channel; 12 miles below Bristol.

PILL, *Pilula*, in *Pharmacy*, a form of medicine, taken dry, resembling a little ball; invented in favour of such as cannot well take ill-tasted medicinal draughts; as also to keep in readiness for occasional use without decaying.

Extracts, when not too hard, may be formed into pills, without any addition; but they are more generally composed of either vegetable, or earthy, or metallic powders, combined by means of syrup into a coherent mass. Salts may also be formed into pills, those that are deliquescent excepted; and when efflorescent salts are used, they should be first freed from the water of crystallization; because the pills formed with uneffloresced salts, which are apt to effloresce, fall into powder as they dry. The masses, which are kept prepared for the formation of pills, should be preserved in covered pots, wrapped in bladders, and occasionally moistened.

No medicine that is intended to operate quickly ought to be made into pills, as they often lie for a considerable time in the stomach before they are dissolved, so as to produce any effect.

Pills are of various kinds, anodyne, fominiferous, laxative, aperitive, hysteric, antinephritic, &c.; but they are principally cathartic.

The basis of cathartic pills is usually aloes; with which are mixed agaric, turbit, hermodactyls, fenna, rhubarb, colocynth. See *EXTRACTUM Catharticum*.

Pills are usually wrapped up in leaf-gold, wafer-paper, or the like, to prevent their ill taste being perceived; but as simple dry powders, as subcarbonate of magnesia or starch, answer all the purposes of this covering, it is now laid aside.

PILLS, *Compound Aloetic*, are to be prepared, according to the directions of the London dispensatory, by beating together, into an uniform mass, one ounce of extract of spiked aloes, half an ounce of extract of gentian, 40 minims of oil of carraway, and a sufficient quantity of syrup. The aloetic pills of the Edinburgh Pharmacopeia consist of equal parts of Socotorine aloes in powder and soap, beaten with simple syrup into a proper mass for pills. The pills of aloes and ginger of the Dublin Pharmacopeia are composed of an ounce of hepatic aloes, a dram of ginger-root in powder, half an ounce of soap, and half a dram of essential oil of peppermint: the aloes and the ginger are rubbed together into a powder, and then the soap and oil are added, so as to form a mass. These are useful pills, and administered with advantage for obviating the habitual costiveness of the sedentary, and of leucophlegmatic habits. The dose is from grs. x to grs. xv, or more.

PILLS of *Aloes and Affasatida* of the Edinb. Ph., consist of equal parts of Socotorine aloes in powder, affasatida, and soap, beaten into a mass with mucilage of gum arabic. These pills are anodyne and cathartic, and have been found useful in dyspepsia, attended with flatulence. The dose is grs. x, given twice a day.

PILLS of *Aloes with Myrrh*, are formed, according to the Lond. Ph., of two ounces of extract of spiked aloes, of an ounce

## PILLS.

ounce of saffron, and the same quantity of myrrh, and a sufficient quantity of syrup: the aloes and the myrrh are rubbed into powder separately, and then all the ingredients are beaten together into an uniform mass. According to the Dub. Ph., half an ounce of myrrh and an ounce of hepatic aloes are pulverised separately; then two drams of saffron and half a dram of oil of carraway being added to them, all the ingredients are beaten together into a mass. The same pills of the Edinb. Ph. are composed of four parts of Socotorine aloes, two parts of myrrh, and one part of saffron, beaten into a mass with simple syrup. These pills have been long used to stimulate and open the bowels in chlorotic, hypochondriacal, and cachectic habits. The dose is from grs. x to ℥j, given twice a day.

Pills of this kind are described by Rhazis, the Arabian, who ascribes the original form to Rufus, after whom they were first named, viz. "pilula Rufi."

*PILLS of Ammoniac of Copper*, of the Edinb. Ph., consist of sixteen grains of ammoniac of copper rubbed to fine powder, four scruples of crumb of bread, and a sufficient quantity of water of carbonate of ammonia, beaten into a mass, and divided into 32 equal pills. These pills are given in epilepsy, and other spasmodic diseases: at first, one pill night and morning is sufficient, but the number may be gradually increased till five be taken for a dose.

*PILLS of Gamboge, Compound*, are directed by the Lond. Ph. to be prepared by mixing together gamboge in powder, extract of spiked aloes in powder, compound powder of cinnamon, of each a dram, and then adding two drams of hard soap, and beating the whole together into an uniform mass. This preparation is much more active than the aloetic pills; the dose is from grs. x to ℥j, given at bed-time in obstinate costiveness.

*PILLS of Iron with Myrrh*, are composed, according to the Lond. Ph., of two drams of myrrh in powder, and subcarbonate of soda, sulphate of iron, and sugar, of each a dram: the myrrh is rubbed with the subcarbonate of soda, then, after having added the sulphate of iron, rubbed again, and then the whole is beaten into a mass. This is an useful emmenagogue pill; the dose is from grs. x to ℥j, given twice or thrice a day.

*PILLS of Galbanum, Compound*, of the Lond. Ph., consist of galbanum, an ounce; myrrh and sagapenum, of each an ounce and a half; assafœtida, half an ounce; and a sufficient quantity of syrup; beaten together into an uniform mass.

*PILLS, Compound Assafœtida*, of the Edinb. Ph., are composed of assafœtida, galbanum, and myrrh, of each eight parts, and of purified oil of amber one part; beaten into a mass, with simple syrup.

*PILLS of Myrrh, Compound*, of the Dubl. Ph., consist of assafœtida, myrrh in powder, and galbanum, of each an ounce, and of oil of amber half a dram; rubbed together, and made into a mass with simple syrup.

These preparations are useful antispasmodics and emmenagogues, and are given with advantage in chlorosis, hysteria, and hypochondriasis. The dose is from grs. x to ℥j, taken every night at bed-time.

*PILLS, Mercurial, Pilule hydrargyri*, often from their colour called the *blue pills*, are prepared, according to the directions of the London and Dublin Pharmacopeias, by rubbing two drams of purified mercury with three drams of confection of red roses, until the globules disappear; then adding a dram of liquorice root in powder; and beating the whole into an uniform mass. The Edinburgh Pharmacopeia directs them to be prepared by rubbing an ounce of

purified mercury with the same quantity of the conserve of red roses, in a glass mortar, until the globules entirely disappear, adding, if necessary, a little mucilage of gum arabic; then adding two ounces of starch, and beating, with a little water, the whole into a mass, which is to be directly divided into 180 pills of equal sizes. N.B. One grain of mercury is contained in four grains of the mass, prepared by the London and Dublin formulæ, and in three grains according to that of Edinburgh. These pills are stimulant and antisyphilitic, and are the most common form of preparation under which mercury is exhibited for the cure of venereal affections, as it is much less liable to act on the bowels than any of the other forms. The common dose is from gr. vi to gr. viij, or two pills, given twice a day till the mouth be affected. Larger doses are apt to excite purging.

*PILLS of Submuriate of Mercury, Pilule hydrargyri submuriatis*, of the London Pharmacopeia, are formed by rubbing a dram of submuriate of mercury (calomel) with the same quantity of precipitated sulphuret of antimony, then with two drams of guaiac gum-resin, and adding a sufficient quantity of copaiba to give the mass a proper consistence. This combination was first recommended by Dr. Plummer, in the Edinburgh Medical Essays, and distinguished in the Edinburgh Pharmacopeia, by the name of "Plummer's Pill." From this pharmacopeia it was afterwards expunged; but as it was much used in practice, it has a place in the London Pharmacopeia. It is a very useful alterative in lepra, in secondary syphilis affecting the skin, and in other cutaneous diseases. The dose is from grs. v to grs. viij, given night and morning.

*PILLS, Compound Rhubarb*, of the Edinburgh Pharmacopeia, are composed of one ounce of rhubarb root in powder, six drams of Socotorine aloes, half an ounce of myrrh, and half a dram of volatile oil of peppermint, beaten into a mass with syrup of orange-peel. This is a warm, stomachic, laxative pill, very useful for obviating costiveness, and at the same time giving tone to the bowels in dyspepsia and hypochondriasis. The dose is from grs. x to ℥j, given twice a day.

*PILLS of Soap and Opium* are prepared, according to the London Pharmacopeia, by beating together half an ounce of hard opium powdered, and two ounces of hard soap, into an uniform mass. Five grains contain one grain of opium.

*PILLS, Opiate*, formerly called *Thebaic pills*, of the Edinburgh Pharmacopeia, consist of one part of opium, seven parts of extract of liquorice, and two parts of pimenta berries; mixing the opium and extract, separately softened with diluted alcohol, and beating them into a pulp: then adding the Jamaica pepper rubbed to powder, and beating the whole into a mass. Ten grains contain one grain of opium.

*PILLS, Storax*, of the Dublin Pharmacopeia, are composed of three drams of purified storax, and soft purified opium and saffron, of each a dram; mix them well together by beating. Five grains contain one grain of opium. These preparations operate as an anodyne; but the dose is different, and must be regulated by the quantity of opium contained in that which is adopted.

*PILLS, Compound Squill*, according to the London Pharmacopeia, are prepared by mixing together one dram of fresh squill-root (bulb) dried and powdered; ginger-root powdered, and hard soap, of each three drams, and two drams of ammoniacum powdered; and beating the mixed powders with the soap, adding as much syrup as will give them a proper consistence.

*PILLS, Squill*, of the Edinburgh Pharmacopeia, are prepared by beating one scruple of squill-root (bulb) dried and

and rubbed to a fine powder, ammoniacum, cardamom-seeds powdered, and extract of liquorice, one dram, with syrup, into a mass.

**PILLS of Squill with Ginger**, of the Dublin Pharmacopeia, are composed of a dram of powder of squill, two drams of ginger-root in powder, and ten drops of essential oil of aniseed, beaten together and formed into a mass with jelly of soap.

These pills are useful expectorants in chronic catarrh, dyspnoea, and asthma; and combined with calomel and digitalis in hydropic affections. As the efficacy of the squill is much injured by keeping in either form, it is perhaps better that it should be always given under the extemporaneous form, except when the tincture is used. The dose is from grs. x to ℥j, given three or four times a day. Thomson's London Dispensatory. London Pharmacopeia, 1809.

**PILLS, Bechic**, a sort of pills good against coughs, so call from the Greek, *βηχ*, cough. They are also called *hypoglotides*, because left like lozenges to dissolve under the tongue.

**PILLS de Cochia.** See COCHIA.

**PILLS of Colocynth with Aloes, Pilulæ colocynthide cum aloë**, a name given in the late London Pharmacopeia to the purging pill, commonly known by the name of *pilule cochia minores*.

As this is originally a prescription of Galen, and the manner of proportioning the ingredients has been altered since his time; the College have ordered it to be made in this manner: take of colocynth, pulp sliced, six drams; extract of spike aloë, powdered, one ounce and a half; scammony gum-resin, powdered, half an ounce; cardamom-seeds, powdered, a dram; hard soap, three drams; and boiling water two pints. Macerate the colocynth pulp in the water for four days, in a gentle heat; strain the solution, and add to it the aloë, scammony, and soap; then, by means of a water bath, evaporate it to a proper consistence, constantly stirring, and about the end of the inspissation, mix in the cardamom-seeds. This is the "extractum colocynthidis compositum," P.L. 1787; "extractum catharticum," P.L. 1745; and "pilulæ Rudii," P.L. 1720. See COLOCYNTHIS.

**Pilulæ colocynthide simpliciores**, a name given in the late London Pharmacopeia to the purging-pill, commonly known by the name of *pil. ex duobus*. It is made of equal parts of colocynth and scammony, with a considerable proportion of oil of cloves; and is beat up to a consistence with syrup of buckthorn.

**PILLS, Composing**, are made by beating together ten grains of purified opium, and half a dram of Castile soap; the whole may be formed into twenty pills: and one, two, or three, may be taken as occasion requires, when a quieting draught will not fit upon the stomach.

**PILLS, Fetid**, are prepared by mixing half an ounce of assa foetida with any simple syrup. In hysterical complaints, four or five pills of an ordinary size may be taken twice or thrice a day. They will also be of service to persons afflicted with the asthma; and they may be made opening, if necessary, by adding a proper quantity of rhubarb, aloes, or jalap, to the above mass.

**PILLS, Hemlock**, are made by taking any quantity of the extract of hemlock, and adding to it about a fifth part its weight of the powder of the dried leaves, and forming it into pills. See CICUTA, in the *Materia Medica*.

**PILLS for the Jaundice** are prepared by taking of Castile soap, Socotorine aloes, and rhubarb, of each one dram, and making them into pills, with a sufficient quantity of syrup or mucilage. See JAUNDICE.

**PILLS, Misfaubin's**, a preparation of mercurius calcinatus (oxydum hydrargyri rubrum), supposed by Mr. Cavendish (Phil. Trans. vol. lxxiv. part i. p. 141.) to be the same with red precipitate, though differently prepared: these pills being disposed to occasion gripes, it has been usual to add a small quantity of opium, and some warm aromatic material. The dose is from half a grain to two grains; five or six grains are said to vomit and purge violently.

**PILLS, Perpetual**, or *Pilule perpetua*, are regulus of antimony made up in pills; thus called, because being swallowed and voided fifty times, they will purge every time with undiminished force. See ANTIMONY.

**PILLS, Plummer's.** See PLUMMER'S *Æthiops*, and **PILLS of Submuriate of Mercury**.

**PILLS, Purging.** See **PILLS of Aloes, Colocynth, &c.** supra.

Purging pills may be made of Socotorine aloes and Castile soap, of each two drams, and a sufficient quantity of simple syrup. Four or five of these will generally prove a sufficient purge. For keeping the body open, one may be taken night and morning. They are reckoned both deobstruent and stomachic, and will be found to answer all the purposes of Dr. Anderson's pills, the principal ingredient of which is aloes. When aloetic purges are improper, let pills be formed of extract of jalap, and vitriolated tartar, of each two drams, and a sufficient quantity of syrup of ginger; which may be taken as above.

**PILL, Rudius's.** See **EXTRACTUM Catharticum**, and **PILLS of Colocynth, &c.** supra.

**PILLS, Soap, Pilule saponaceæ**, a form of medicine prescribed in the late London Dispensatory, and ordered to be made in the following manner: take almond soap, four ounces; strained opium, half an ounce; essence of lemons, a dram; soften the opium a little with wine, and beat that and the soap with the essence, till it be reduced to the form of a pill. See OPIUM, and **PILLS of Soap, &c.** supra.

This is intended to supply the place of a pill commonly called *Matthew's* pill, and is very happily corrected in regard to the taste of the soap, by the addition of the essence of lemons.

**PILLS, Stomachic**, are made of extract of gentian, two drams; powdered rhubarb and vitriolated tartar, of each one dram; oil of mint, thirty drops: and a sufficient quantity of simple syrup. Three or four of these may be taken twice a day, for invigorating the stomach, and keeping the body gently open.

**PILLS, Strengthening**, are made of soft extract of the bark, and salt of steel, of each half an ounce. In disorders arising from excessive debility or relaxation of the solids, as the chlorosis, or green sickness, two of these pills may be taken three times a day.

**PILL, Ward's.** See **WARD'S Pill**.

**PILLAGE**, among *Builders*, is sometimes used for a square pillar, standing behind a column to bear up the arches; having a round base and capital, as a pillar has.

**PILLAGE Bay**, in *Geography*, a bay on the S. coast of Labrador. N. lat. 50° 17'. W. long. 62° 58'.

**PILLAR**, in *Architecture*, a kind of irregular column, round and insulate; but deviating from the proportions of a just column.

Pillars are always either too massive, or too slender, for a regular architecture. In effect, pillars are not restrained to any rules: their parts and proportions are arbitrary. Such, *e. gr.* are the pillars which support Saracenic vaults, and other buildings, &c.

A square pillar is a massive work, called also pier, or pierdroit,

piedroit, serving to support arches, &c. See PIER, and PIEDROIT.

Butting-pillar is a butment, or body of masonry, raised to prop, or sustain, the thrust of a vault, arch, or other work. See BUTTRESS.

It seems not impossible for stone to be cast into the shape of pillars. We find mention made in the Philosophical Transactions, of two pillars of stone at Fontevraud, in France, each about sixty feet high, all of one solid piece, which are said to have been run. (N<sup>o</sup> 481. p. 328. in Not.) Pillars of stone were anciently erected, as sepulchral monuments, near the highways; and also in memory of some victory. We find traces of this custom in Cornwall and Wales, where these pillars are often found, and called *meinigwir*, a stone for play, perhaps in memory of funeral games; and sometimes *llech*, that is, *tabula faxeae*. Phil. Transf. N<sup>o</sup> 458. p. 471.

Pompey's pillar is a famous monument of antiquity, constructed of red granite, and situated on a rock, about a mile without the walls of Alexandria, in Egypt. By the mensuration of Edward Wortley Montagu, esq. the capital of the pillar, which is Corinthian, with palm leaves, and not indented, is nine feet seven inches high; the shaft sixty-six feet one and a quarter inch; the base five feet nine three quarter inches; the pedestal ten feet five and a half inches; the height from the ground ninety-two feet: though Dr. Pococke, by the shadow, determined the whole height to be one hundred and fourteen feet; and its diameter nine feet and an inch. It is perfectly well polished, and only a little shivered on the eastern side. Nothing can equal the majesty of this monument: seen from a distance, it over-tops the town, and serves as a signal for vessels. Approaching it near, it produces, says Savary, an astonishment mixed with awe. One can never be tired with admiring the beauty of the capital, the length of the shaft, nor the extraordinary simplicity of the pedestal. This prodigious mass stands, as on a pivot, on a reversed obelisk; and was erected, as many have supposed, either by Pompey, or to his honour. But as no mention is made of it by Strabo, Diodorus Siculus, or any other ancient writers, Mr. Montagu concludes that it was not known before the time of Vespasian, and that it was erected to his honour. In proof of this opinion, he found within the circumference of the pillar a medal of Vespasian in fine order.

Savary, on the authority of Abulfeda, who calls it "the pillar of Severus," ascribes it to this emperor; alleging that he visited Egypt, gave a senate to Alexandria, and deserved well of its inhabitants. Accordingly, it is said, that this column was a mark of their gratitude. The Greek inscription, half effaced, which is visible on the west side when the sun shines upon it, was legible, without doubt, in the time of Abulfeda, and preserved the name of Severus. Nor is this the only monument erected to him by the gratitude of the Alexandrians. In the midst of the ruins of Antinoe built by Adrian, is seen a magnificent pillar, the inscription on which is still remaining, dedicated to Alexander Severus.

Denon has given a drawing of this pillar, with the marked dimensions of its various parts: he makes its whole height a fraction more than 92 feet, and the height of the shaft, which is of a single piece, 63 feet 1.3. It acquired, as this author says, the name of Pompey's pillar in the 15th century. A monument, as he supposes, had been raised by Pompey at Alexandria, but it had disappeared, and was thought to be recovered in this pillar or column, which has since been converted into a trophy erected to the memory of Septimius Severus. It is, however, placed on the ruins of the ancient city; and in the time of Septimius Severus, the city of the

Ptolemies was not in a ruinous state. To support this column by a solid foundation, an obelisk has been sunk in the earth, on which is placed a very clumsy pedestal, having a fine shaft, and surmounted by a Corinthian capital of bad workmanship. If the shaft of this column, continues Denon, separating it from the pedestal and the capital, once belonged to an ancient edifice, it is an evidence of its magnificence, and of the skill with which it was executed. It ought, therefore, to be said, that what is called Pompey's pillar is a fine column, and not a fine monument; and that a column is not a monument. The earth about the foundation of this pillar having been cleared away by time, two fragments of an obelisk, of white marble, the only monument of that substance seen by Denon in Egypt, have been added to the original base, to render it more solid. After having observed that the column, entitled Pompey's pillar, is very chaste both in style and execution; that the pedestal and capital are not formed of the same granite as the shaft; that their workmanship is heavy, and appears to be merely a rough draft; and that the foundations, made up of fragments, indicate a modern construction; it may be concluded, says our author, that this monument is not antique; and that it may have been erected either in the time of the Greek emperors, or of the caliphs; since, if the capital and pedestal are well enough wrought to belong to the former of these periods, they are not so perfect but that art may have reached so far in the latter. See Pococke's Description of the East, vol. i. p. 8. and Phil. Transf. vol. lvii. art. 42. Savary's Letters in Egypt, vol. i. Denon's Travels in Egypt, vol. i.

PILLAR, in the *Manege*, signifies the centre of the volta, ring, or manege ground, round which a horse turns, whether there be a wooden pillar in it or not.

There are also pillars in maneges on the circumference, or side, placed at certain distances, by two and two. To distinguish these from that of the centre, they are called the *two pillars*. When these latter are spoken of, it is usual to say, *Work the horse between the two pillars*. When the former, it is called, *Working round the pillar*. The use of the pillar in the centre is for regulating the extent of the ground, that the manege upon the volts may be performed with method and justice, and that they may work in a square, by rule and measure, upon the four lines of the volts; and also to break unruly high-mettled horses, without endangering the rider.

The two pillars are placed at the distance of two or three paces one from the other. The horse is put between these, to teach him to rise before, and yerk out behind, and put himself upon raised airs, &c. either by the aids, or chastisement.

It has been supposed, that the hint of using pillars in the manege was taken from a contrivance of Eumenes; who, as Plutarch relates it, being besieged at the fort of Nora, by Antigonus, and fearing lest his horses should suffer for want of action, contrived a method of working them, without removing them from their stalls. For this purpose he placed a pulley over their heads in the beams of the stables, with which, by means of running reins, he pulled up their fore-parts, causing at the same time people to stand behind them, who, urging and lashing them with whips, put them into motion, made them yerk out behind, raising and moving their fore-legs, and work and chafe themselves till they sweat copiously; by these means he preserved their health, kept them in wind, and ready for service. The single pillar, once so frequent in maneges, but now laid aside, was first used in Naples, and owes its origin to the want of covered buildings for siding and breaking horses: in lieu of which they

they dug trenches for working their horses; the sides of the trenches supplying the want of walls, and producing in a certain degree the same effect. The famous Pignatelli, of Naples, having no covered manege, worked his horses in the open air, and used to tie them to a tree, and work them round it. Pluvinal, of France, was one of his scholars; and returning to France, where he professed horsemanship, he placed a post or pillar in his manege, in imitation of Pignatelli's tree, and made the same use of it: to this he soon added another of the same size and height; which two pillars were calculated to answer purposes different from those for which the single pillar had been erected: the two pillars are still in use, and reckoned an essential piece of furniture in all riding-houses. The single pillar has been long discontinued, but may be employed to advantage upon certain occasions; especially where a horseman undertakes to *longe* a horse, without the assistance of another person. It should be observed that no horse ought to be put between the two pillars till he is well supplied; and has acquired the first principles of the union between the legs, which are the natural pillars that every horseman should employ. The horse should be gently worked at first, that he may not become furious, and he should be made to go only from side to side by means of the switch, or from fear of the chambriere. In a few days, when he is accustomed to the subjection of the pillars, try to make him insensibly go into the cords, and endeavour to get from him a step or two exact, and in time of the *passage* or *piaffer*.

The worst effect of the pillars is the hazard you run of entirely ruining the hocks of your horse, if you do not distinguish very exactly between these parts and the haunches. Berenger's Hist. and Art. of Horsemanship, vol. ii. p. 60. and 164, &c.

PILLAR, *Cape*, in *Geography*, a cape at the western entrance of the straits of Magellan, which is known by a large gap upon the top; and when it bears W.S.W. an island appears off it which has an appearance somewhat like a hay-stack, and about which lie several rocks. The strait to the eastward of the cape is between seven and eight leagues over; the land on each side is of a moderate height, but it is lowest on the north shore, the south shore being much the boldest, though both are craggy and broken. Westminster island is nearer to the north than the south shore; and by the compass lies N.E. from cape Pillar. S. lat. 52° 45'. W. long. 75° 10'.

PILLARS, in *Ship Building*, are square or round columns of timber, fixed perpendicularly under the middle of the beams for the support of the decks.

PILLARS, *Ropes of two*. See ROPE.

PILLAU, in *Geography*, a sea-port town of Prussia, in the province of Samland, situated on a tongue of land that projects into the Baltic, at the entrance of the Frisch Haff, with a good harbour; well fortified, and considered as the bulwark and key of the kingdom. The streets are broad and straight; and the houses are built and furnished in the Dutch taste. This harbour is frequented by foreign ships, and the town is the resort of people of various nations. The fort is nearly a regular pentagon; the bastions exhibit a grand appearance; and all the edifices belonging to the fortifications are strong, handsome, and regular. Here is also a magazine for military stores. In the fort there is a church, serving for both the Lutherans and Calvinists, and below the gate of the castle is a stone equestrian statue of Frederic William the Great. Over the gate, on one side of the entrance, stands the image of Mars, in a bold attitude, looking towards Sweden. The peninsula along

which the road from Pillau to Fischhausen lies, is called the "Paradise of Prussia," from its pleasantness and fertility. Near the fort is a fine plain, where the Frisch Haff forms a fine semicircular bay, that is frequented by a great number of swans, sea-mews, wild-ducks, and other water-fowl. On the other side of the bay lies Alt Pillau or Old Pillau, inhabited by fishermen; 22 miles W.S.W. of Königsberg. N. lat. 54° 37'. E. long. 19° 55'.

PILLE of *Foddray*, or PILE *Fouldery*, in the county of Lancaster; a defence built on a creek of the sea, called *Pille*, by the idiom of the county, for a pile, or a fort, built for the safeguard or protection of any place.

This pile was erected there by the abbot of Fournesse, in the first year of Edward III. Camd. Brit. Rex. "Dedimus Henrico comiti Northum. infulam, castrum, pelam, & dominium de Man, &c." Rot. Par. 1 Hen. IV.

PILLEER, in *Geography*, a town of Hindoostan, in Myfore; nine miles N.W. of Dalmachery.

PILLERSTORFF, a town of Austria, on the river Rusbach; eight miles E.N.E. of Korn-Neuburg.

PILLIBeat, a town of Hindoostan, in Rohilcund; 28 miles N.E. of Bereilly. N. lat. 28° 36'. E. long. 80° 10'.

PILLORY was anciently a post erected in a cross road, by the lord, as a mark of his feigniory, with his arms on it, and sometimes with a collar to tie criminals to.

PILLORY, at present, is a wooden machine, on which certain criminals, as perjurers, &c. are fastened, and exposed to the public derision.

With us it is in the form of a frame erected on a pillar, and made with holes and folding boards, through which the heads and hands of criminals are put.

The etymology of this word has been variously assigned by different writers: Spelman derives it from the French *pilleur*, *depeculator*; Cowel from *πύλος*, *janua*, and *ορειω*, *video*; but the etymology of Du-Cange is the most probable, who derives it from *pila*, a pillar.

In the laws of Canutus it is called *bealþchang*. Sir Henry Spelman says it is *supplicii machina ad ludibrium, magis quam panam*. It was peculiarly intended for the punishment of bakers who should be caught faulty in the weight, or fineness, of their bread. In old charters it is called *collistrigium*.

The pillory in Paris is in the middle of a round tower, with openings on every side. It is moveable on an axis, or arbor; round which the executioner gives the criminal the number of turns appointed in court; stopping him at each opening, to shew him to the people. It was intended for several kinds of criminals, particularly for fraudulent bankrupts; and all those who made a cession, or surrender, of their effects to their creditors, were obliged to take some turns round the pillory on foot, with a green cap on.

PILLOW of a *Plough*, a term used by the farmers to express that part of a plough which serves to raise or sink the beam, and with it the share, as the land is to be ploughed shallower or deeper.

This pillow is a cross piece of wood, reaching from one of the crow-staves, or uprights, to the other; and as they are bored with two rows of holes, this pillow can be slipped up or down to any height, and kept there by pegs or cords in the holes. See PLOUGH.

PILLOW, in a *Ship*, is that piece of timber whereon the bowprit rests at its coming out of the hull aloft, close by the stem.

PILLVENKEGEN, in *Ornithology*, the name of a bird approaching to the snipe kind; described by Aldrovand, and supposed by some to be the bird we call the *knot*.

PILNAUD, in *Geography*. See PALNAUD.

PILNIKAW, a town of Bohemia, in the circle of Koeniggratz; five miles W.S.W. of Trautenau.

PILNITZ, a town of Saxony, in the margraviate of Meissen, seated on the Elbe, in which is a royal palace; celebrated for a treaty entered into by the powers of Europe against France in 1792; seven miles S.E. of Dresden.

PILLOBOLUS, in *Botany*, from *πῖλος*, a cap or cover, and *βολος*, a throw, or cast. Tode Fung. Mecklenb. fasc. 1. 41. Perf. Syn. 117.—Class and order, *Cryptogamia Fungi*. Nat. Ord. *Fungi*.

Ess. Ch. Receptacle stalk-like, pellucid, bearing a naked vesicle, which flies off elastically.

1. *P. crystallinus*. Perf. Obf. Mycolog. v. 1. 76—78. t. 4. f. 9—11. Fl. Dan. t. 1080. (Mucor urceolatus; Diekf. Crypt. fasc. 1. 25. t. 3. f. 6. Bull. Fung. t. 480. f. 1.)—Receptacle obovate. Vesicle hemispherical, black.—Common in autumn on horse or cow-dung. In an early state it appears, according to the observations of Persoon, like some little yellowish kind of *Sphæria*; but it soon becomes an obovate, stalked, pellucid, whitish body, about half an inch high, full of a clear watery liquor, and bearing on its top a black hemispherical head, of short duration.

2. *P. roridus*. Perf. n. 2. (Mucor roridus; Bolt. Fung. t. 132. f. 4. Relh. Cant. 548?)—Receptacle globose, with a capillary stalk. Vesicle depressed, black.—Found by Bolton on horse-dung, in fields about Halifax, in August and September, when the morning is cloudy, as it perishes when the sun shines upon it. The plants are four lines high, growing in clusters, and distinguished from the former by the long slender stalk, globose head, and minute, depressed, black vesicle.

PILOCARPUS, from *πῖλος*, a cover, and *καρπος*, fruit. Vahl Ecolg. v. 1. 29. Willd. Sp. Pl. v. 1. 1133. Mart. Mill. Dict. v. 3.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Dumose*, Linn. *Rhamni*, Juss.

Ess. Ch. Calyx of five leaves. Petals five. Stamens inserted under the germin. Capsules five, combined at the base, elastic. Seeds solitary, tunicated.

1. *P. racemosus*. Vahl t. 10. (Euonymus latifolius racemosus, fructu pentagono atropurpureo; Plum. Ic. 119. t. 127.)—Native of lofty mountains in the island of Montserrat. A low shrub, with pendulous branches. Leaves alternate, on short stalks, elliptical, entire, very obtuse, and generally emarginate. Clusters terminal, solitary, many-flowered, a foot or more in length. We readily agree with Willdenow that this plant is very nearly akin to *Euonymus*; certainly far more so than to *Pruus*, to which Burmann, the editor of Plumier, refers it!

PILORUS, in *Ancient Geography*, a town of Macedonia, situated at the foot of mount Athos, or rather on the Singitic gulf, S.W. of Asia.

PILOSE LEAF, in *Botany*. See LEAF.

PILOSELLA, diminutive of *pilosa*, hairy, an old appellation, and now the Linnæan specific name, of a very common species of *Hieracium*, remarkable for the long tawny hairs of its leaves.

PILOT, the person who superintends the navigation of a ship, either upon the sea-coast, or on the main ocean; but it is more particularly applied to a person retained on board a ship to conduct it into a road or harbour, or over bars or sands; or through serpentine and intricate channels, or the like.

Menage derives the word pilot from *prorita*; *q. d.* he who governs the prow, or head. Others fetch it from the old French *pîle*, a ship.

Pilots are no constant and standing officers on board our vessels; but are mostly called in occasionally, on coasts and

shores unknown to the master. And, having done their parts in piloting the vessel, they return to shore, where they reside.

The regulations, with regard to pilots in the royal navy, are as follow: the commanders of the king's ships, in order to give all reasonable encouragement to so useful a body of men as pilots, and to remove all their objections to his majesty's service, are strictly charged to treat them with good usage, and in equal respect with warrant-officers.

The purser of the ship is always to have a set of bedding provided on board for the pilots, and the captain is to order the boatswain to supply them with hammocks, and a convenient place to lie in, near their duty, and apart from the common men; which bedding and hammocks are to be returned when the pilots leave the ship.

A pilot, when conducting one of his majesty's ships in pilot-water, shall have the sole charge and command of the ship, and may give orders for steering; setting, trimming, or furling the sails; tacking the ship; or whatever concerns the navigation: and the captain is to take care that all the officers and crew obey his orders. But the captain is diligently to observe the conduct of the pilot, and if he judges him to behave so ill as to bring the ship into danger, he may remove him from the command and charge of the ship, and take such methods for her preservation as shall be judged necessary; remarking upon the log-book the exact hour and time when the pilot was removed from his office, and the reasons assigned for it.

Captains of the king's ships, employing pilots in foreign parts of his majesty's dominions, shall, after performance of the service, give a certificate thereof to the pilot, which being produced to the proper naval officer, he shall cause the same to be immediately paid; but if there be no naval officer there, the captain of his majesty's ship shall pay him, and send the proper vouchers, with his bill, to the navy-board, in order to be paid as bills of exchange.

Captains of his majesty's ships, employing foreign pilots, to carry the ships they command into or out of foreign ports, shall pay them the rates due by the establishment or custom of the country, before they discharge them; whose receipts being duly vouched, and sent with a certificate of the service performed, to the navy-board, they shall cause them to be paid with the same exactness as they do bills of exchange. Regulations and Instructions of the Sea Service, &c.

Pilots of ships taking upon them to conduct any ship from Dover, &c. to any place up the river Thames, are to be first examined and proved by the master and wardens of the Trinity-house, &c. or shall forfeit 10*l.* for the first offence, 20*l.* for the second, and 40*l.* for every other offence; one moiety to the informer, the other to the master and wardens; but any master or mate of a ship may pilot his own vessel up the river: and if any ship be lost through the negligence of any pilot, he shall be for ever afterwards disabled to act as a pilot. (3 Geo. I. cap. 13.) The lord wardens of the cinque-ports may also make rules for the government of pilots, and order a sufficient number to ply at sea to conduct ships up the Thames. 7 Geo. I. cap. 21.

No person shall act as a pilot on the Thames, &c. (except in collier ships) without licence from the master and wardens of the Trinity-house, at Deptford, on pain of forfeiting 20*l.* Pilots are to be subject to the government of that corporation, and pay ancient dues not exceeding 1*l.* in the pound out of wages for the use of the poor thereof. (5 Geo. II. cap. 20.) In charter parties of affreightment, the master generally covenants to find a pilot, and the merchant to pay him; and in case the ship shall miscarry through

the insufficiency of the pilot, the merchant may charge either the master or the pilot; and if he charges the master, such master must have his remedy against the pilot. *Lex Mercator.* 70.

Among the French, pilot is also used for a steersman, or an officer on board a ship, who always watches her course, and directs it.

There are among the French two kinds of pilots; the one a coasting pilot, well acquainted with the coasts, ports, roads, bars, sands, &c., and who commands in sight thereof.

The other an officer who makes observations, and takes altitudes out at sea; uses the quadrant and fore-staff; and also watches the compass.

The pilot is always the second person in the ship, whether it be a man of war, or merchant-man. In the former the captain is the first, the pilot the second. In a merchant-ship, the master is the first, the pilot after him.

The pilot is also the steersman, who stands at the helm, and manages the rudder.

**PILOTAGE**, money paid for piloting a ship.

**PILOTING**, in *Navigation*, is either common or proper: common piloting is that art which consists in coasting along shore, or sailing within sight of land. Proper piloting is the art of sailing to distant places through the ocean, and out of sight of land. See *NAVIGATION*, *PILOT*, and *SAILING*.

**PILOTO**, or *Salinas del Piloto*, in *Geography*, craggy rocks on the W. coast of Mexico, S.E. of Cape Corientes, where are good anchorage, and shelter from N.W. and W. and S.W. winds, and near which are salt-pits.

**PILOT-TOWN**, a town of America, in Suffex county, Delaware; six miles N.W. of Cape Healopen.

**PILOUTA**, a town of Candahar, on the Attock; 90 miles N.N.W. of Moultan.

**PILOUTAI HOTUN**, a town of Chinese Tartary, near the river Hoang-ho; 305 miles W. of Peking. N. lat. 40° 38'. E. long. 108° 43'.

**PILPAY**, or *BIDPAY*, in *Biography*, an oriental philosopher, of whose country, time, life, or works, little is known with any degree of certainty. According to tradition he was the counsellor and vizier to an ancient king of India, for whose use he composed his famous apologues or fables. These apologues are in the form of dialogues between two animals of a species very like the European fox. The fame of this work having reached Persia, Chosroes, the king of that country, is said to have sent his physician into India for the sole purpose of procuring a copy of it. This physician, being permitted to peruse it in the library of the Indian king, translated it into the ancient Persian, and gave it the title of the *royal or august book*. Such is the account given of Pilpay, and of the introduction of his fables into Persia. The work itself is thought to contain internal evidence of its having been written at a much later period. It has been translated into most of the modern languages; but the best European version is the French one of M. Galland, published in two vols. 12mo. 1714, with relics of the fables of Lokman. The same writer published the translation of another work attributed to Pilpay, entitled "The Shipwreck of the floating Islands, or the Basiliad." *Enfield's Hist. Phil.*

**PILSEN**, in *Geography*, a town of Hungary, on the river Ipol; 10 miles N.E. of Gran.—Also, a well-built and fortified town of Bohemia, and capital of a circle of the same name, situated near the conflux of the rivers Miza and Radbuzo. The circle is rich in sheep; and the cheese made by the inhabitants is preferred to any other in the kingdom;

44 miles S.W. of Prague. N. lat. 49° 43'. E. long. 13° 33'.

**PILSENITZ**, a town of Bohemia, in the circle of Pilsen; five miles S.E. of Pilsen.

**PILSNO**, a town of Austrian Poland; 56 miles S.W. of Sandomirz.

**PILSTART**. See *PYLSTART*.

**PILSTING**, a town of Bavaria; two miles N. of Landau.

**PILTEN**, a town of the duchy of Courland, and capital of a district, anciently called "the diocese of Courland;" 12 miles N.N.W. of Goldingen. N. lat. 57° 5'. E. long. 21° 38'.

**PILTEN Lake**, a lake of Chinese Tartary, 23 miles in circumference; 25 miles S.W. of Nimgouta.

**PILULARIA**, in *Botany*, from *pilula*, a little ball, or pill, in allusion to the shape of its receptacles.—*Linn. Gen.* 561. *Schreb.* 754. *Mart. Mill. Dict.* v. 3. *Sm. Fl. Brit.* 1143. *Juss.* 16. *Lamarck Illustr.* t. 862. *Class* and order, *Cryptogamia Filices*, or perhaps *Monocia Polyanthra*. *Nat. Ord. Filices*, *Linn. Juss.*

*Ess. Ch.* Common receptacle globose, of four cells and four valves, filled with numerous anthers in the upper part, and numerous pistils in the lower. Seeds coated.

1. *P. globulifera*. *Pillwort*. *Linn. Sp. Pl.* 1563. *Engl. Bot.* t. 521. *Bolt. Fil.* 72. t. 40. *Fl. Dan.* t. 223. *Bulliard* t. 375. (*P. palustris juncifolia*; *Vaill. Par.* t. 15. f. 6. *Dill. Musc.* 538. t. 79. *Pepper-grass*; *Pet. Herb. Brit.* t. 9. f. 8.)—This, the only known species of its genus, is found on heaths that are partially inundated, in various parts of England, France, and Germany, flowering in June and July. The thread-like *stem* creeps close to the ground, with fibrous *roots* supposed to be perennial, and throws up many erect, scattered or clustered, awl-shaped, smooth, simple branches, two or three inches high, each of which unrolls, in the peculiar manner of genuine ferns, or of some intermediate plants between ferns and palms, as the *Cycas* and *Zamia*, to which, however widely different in dimensions, the *Pilularia* is perhaps most allied. Its little blackish globular *fruits*, or *receptacles*, resembling pepper-corns, are solitary, and nearly sessile, at the bases of the branches, and are externally downy. *Bulliard's* figure is excellent.

**PILUM**, in *Roman Antiquity*, a massive weapon, which in charge they darted upon the enemy. It was commonly four-square, but sometimes round, composed of a piece of wood three cubits long, and a slip of iron of the same length, hooked and jagged at the end.

**PILWARA**, in *Geography*, a town of Hindoostan, in Oudipour; 40 miles N. of Oudipour. N. lat. 25° 19'. E. long. 74° 25'.

**PILY BARRY**. See *BARRY Pily*.

**PILZICHE**, in *Geography*, a town of Saxony, in the circle of Erzgebirg; 10 miles S.E. of Schwarzenberg.

**PIMBLE-MERE**. See *BALA POOL*.

**PIMELA**, in *Botany*, from *πιμελον*, *fatness*, because of the oily nature of its nut, a genus of Loureiro's, Cochinch. 407. See *CANARIUM*.

**PIMELÆA**, a name adopted, by the writer of this, from the manuscripts of the celebrated Solander, and derived from *πιμελον*, *fatness*; in allusion, as it is supposed, to the oiliness of its little oval seed, like an olive in miniature. As there is a Fabrician genus of insects named *Pimelia*, from their corpulent shape, we wish to include the idea of an olive, *ελαια*, in the above word; writing it therefore with a diphthong, to guard against ambiguity, either in its sense or pronunciation.—*Sm. Bot. of New Holl.* 31. *Mart. Mill. Dict.* v. 3. *Willd. Sp. Pl.* v. 1. 50. *Vahl. Enum.*

3. 1. 305. Brown Prodr. Nov. Holl. v. 1. 359. Ait. Hort. Kew. v. 1. 25. Lamareck Illustr. t. 9. (Bankia; Forst. Gen. t. 4.)—Class and order, *Diandria Monogynia*. Nat. Ord. *Veprucule*, Linn. *Thymelæa*, Juss. Brown.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, funnel-shaped, coloured; tube thread-shaped, very long; limb spreading, in four deep segments, two opposite ones exterior; mouth naked and pervious. *Cor.* none. *Stam.* Filaments two, capillary, inserted into the mouth of the tube, opposite to the outer segments (*Brown*); anthers roundish, erect, simple, of two cells. *Pist.* Germen ovate, superior; style thread-shaped, as long as the tube, inserted laterally into the germen; style capitate, small, smooth. *Peric.* a dry, or slightly succulent, berry, with a thin coat. *Seed* solitary, ovate, obliquely pointed.

Ess. Ch. Calyx funnel-shaped, four-lobed, coloured, withering. Petals none. Stamens prominent, inserted into the top of the tube. Style lateral. Stigma capitate, smooth. Seed coated.

Obs. This genus comes nearest in technical characters to *Passerina*, from which it differs nevertheless sufficiently, in having but two stamens instead of eight, and, if we mistake not, a constantly smooth stigma, instead of a hispid one. (See *PASSERINA*, *GNIDIA*, and *DAPHNE*, for remarks on the generic characters of this tribe.) Forster originally called the genus before us *Bankia*; but its species having all been reduced, by Linnæus and his son, to *Passerina*, a much finer genus was fortunately chosen to commemorate our illustrious countryman, and the name which he and his friend Dr. Solander had first contrived for this, is now retained. Of its numerous species we know not how to give any thing more than a comprehensive idea, nor can we calculate their number with perfect precision. Willdenow has only four, consisting of our *linifolia*, first published in the Botany of New Holland, and the three Forsterian *Bankiæ*, given as *Passerina* in Linn. Suppl. 226, 227. Vahl has added two. Labillardiere describes six more, from the south coast of New Holland. But Mr. Brown has carried our knowledge of this genus far beyond any preceding writer, as he defines thirty-four species of *Pimelæa* from New Holland alone. In these are not included the above three plants of Forster, nor the *virgata* of Vahl, being natives of New Zealand only; from which country we are possessed of three others, given by sir Joseph Banks to the younger Linnæus, and hitherto, we believe, entirely nondescript. Thus the known species may be reckoned to amount to forty-one. Of these *linifolia* alone is mentioned in the Hortus Kewensis, as cultivated in Britain. Mr. Brown divides this genus into five sections, of which we shall give examples.

SECT. 1. *Leaves opposite. Flowers in a terminal head. involucrem (or rather four bractæas) unlike the leaves.* Fourteen species.

*P. cornucopia.* Vahl. n. 1. Br. n. 1.—Common bractea of one leaf, funnel-shaped, with four broad acute segments. Stem herbaceous.—Gathered by sir Joseph Banks at New South Wales, in 1770. Mr. Brown has met with the same in the tropical part of New Holland. This is one of the very few herbaceous species, most of the genus being shrubby, with the habit of *Daphne* and *Passerina*. Every part is smooth. *Branches* slender. *Leaves* an inch long, more or less, elliptic-lanceolate, entire as in all the rest of this natural order, of a fine green, minutely dotted. *Flowers* small, greenish-yellow, with a reddish slender tube about half an inch long. *Stamens* about the length of the rather unequal limb. The head of *flowers* is encompassed with four broad, acute, green *bractæas*, about its own length,

the two outermost heart-shaped at the bottom, and all connected by an inversely conical basis, of one leaf, resembling a *cornucopia*.

*P. linifolia.* Flax-leaved *Pimelæa*. Sm. Bot. of New Holl. 31. t. 11. Willd. n. 1. Br. n. 4. Vahl n. 2. Curt. Mag. t. 891.—*Bractæas* ovate, broad, smooth on both sides, half the length of the head. Tube of the calyx silky. Leaves linear-lanceolate, or partly spatulate, stalked, single-ribbed.—Native of New South Wales and the island of Van Diemen. *Br.* In England it is a green-house shrub, bearing, from February to August, a profusion of elegant, white, but inodorous, *flowers*. The copious straight *branches* are clothed with numerous, smooth *leaves*, about an inch long, variable in breadth. The globular bristly common *receptacle* remains long after the *flowers* and *seeds* are fallen, surmounted by numerous young flowering branches.

SECT. 2. *Leaves opposite. Head terminal. Bractæas scarcely different from the leaves.* Fifteen species in Mr. Brown's Prodrum; to which are to be added the New Zealand species, all of them, as far as we have seen, answering to the character of this section.

*P. drupacea.* Labill. Nov. Holl. v. 1. 10. t. 7. Br. n. 27.—Leaves oval-oblong, flat, slightly downy beneath; floral ones longer than the head. Tube of the calyx cylindrical, deciduous. Fruit pulpy.—From Van Diemen's land. Above six feet high. Young *branches* hairy. *Leaves* about an inch and a half long; the floral ones two or four, sometimes larger, sometimes smaller, than the rest. Besides the usual terminal head of *flowers*, there are several small, opposite, axillary ones, with two diminutive floral leaves to each. *Stamens* half the length of the limb. *Berry* black, pulpy.

*P. longifolia.* Banks, Herb. Linn. fil.—Leaves lanceolate, acute, smooth on both sides; floral ones twice as long as the many-flowered head. Calyx externally silky.—Gathered by sir J. Banks at New Zealand, in 1769. This seems to be a tall and handsome *shrub*, smooth in every part except the *flowers*, which are white, externally silky, with elliptical obtuse segments. *Leaves* willow-like, three inches long, half an inch wide, on short broad *footstalks*; the floral ones four, half the size of the rest, but full twice the length of the flowers.

*P. lævigata.* (*P. lævigata*  $\beta$ ; *ibid.*)—Leaves ovate, obtuse, concave, smooth on both sides; floral ones the length of the head. Calyx and young branches silky.—From the same country. *Stem* apparently procumbent. Young *branches* numerous, clothed with fine, dense, rather prominent, white, silky hairs. *Leaves* scarcely above a quarter of an inch long, perfectly smooth and naked; the floral ones exactly like the rest. *Flowers* many in each head, the length of the leaves, externally finely silky; their segments broad and rounded.

*P. villosa.* *Ibid.*—Leaves imbricated, ovate, acute, concave; smooth above; very hairy beneath; floral ones the length of the head. Calyx and young branches hairy.—From the same country. This agrees with the last in size, but seems more erect, and differs in the long shaggy, though shining, pubescence of the *flowers*, young *branches*, and backs of the *leaves*.

*P. prostrata.* Vahl n. 6. (*P. lævigata*  $\alpha$ ; Banks, H. Linn. fil. *Bankia* prostrata; Forst. Gen. t. 4. f. k—*n.* *Passerina* prostrata; Linn. Suppl. 227. Forst. Prodr. 28.)—Leaves elliptical, obtuse, concave, smooth on both sides; floral ones the length of the head. Calyx and young branches hairy.—Native of dry hills in New Zealand. Very like the last but one, though smaller in all its parts, with elliptical

elliptical rather than ovate *leaves*, fewer *flowers* in each head, and slightly hairy, rather than densely silky, young *branches*, as well as *calyx*. It is still possible this and *lævigata* may be varieties of each other, as their original discoverers thought.

*P. pilosa*. Vahl. n. 4. (*Bankfia tomentosa*; Forst. Gen. n. 2. *Passerina pilosa*; Linn. Suppl. 226. Forst. Prodr. 28.)—*Leaves* lanceolate, obtuse, hairy beneath; floral ones rather ovate, twice the length of the few, lateral or terminal, hairy flowers.—Found in New Zealand.—*Stem* erect, woody. *Branches* repeatedly forked, short, spreading, silky. *Leaves* about an inch long; losing their hairs by age.

*P. Gnidia*. Vahl n. 3. (*Bankfia Gnidia*; Forst. Gen. t. 4. f. a—i. *Passerina Gnidia*; Linn. Suppl. 226. Forst. Prodr. 28.)—*Leaves* ovato-lanceolate, acute, stalked, rigid, channelled, quite smooth, as well as the branches. *Calyx* very hairy.—Found in the fissures of rocks in New Zealand, near the coast, as well as on the loftiest mountains. The copious bright-green *leaves*, about an inch long, have the aspect of myrtle. The floral ones rather exceed in length the dense heads of copious white *flowers*, whose outside is very hairy.

SECT. 3. *Leaves opposite. Flowers spiked.* One species only.

*P. spicata*. Br. n. 30.—*Leaves* oval, smooth, as well as the calyx. Spikes naked. Flowers polygamous. Br.—Found near Port Jackson, New South Wales. This is a delicate, smooth, upright species, whose *leaves* have the aspect of some *Hypericum* or *Euphorbia*. The *flowers* are of a yellowish-green, tipped with purple, and are remarkable for forming a simple corymbose smooth *spike*, at the summit of each branch. The segments of the *calyx* are broad and obtuse; tube very slender, quite smooth.

SECT. 4. *Leaves opposite. Flowers axillary.* One species.

*P. argentea*. Br. n. 31.—“*Leaves* lanceolate, silvery on both sides. Flowers from two to four together, axillary.”—Gathered by Mr. Brown on the south coast of New Holland. We have seen no specimen.

SECT. 5. *Leaves alternate.* Three species.

*P. curviflora*. Br. n. 32.—*Leaves* elliptic-oblong; smooth above; somewhat silky beneath, like the branches, with depressed hairs. Heads lateral, of few flowers. *Calyx* silky; tube curved; limb unequal.—Native of Port Jackson. We have fine specimens from Sir J. Banks. This is a humble shrubby species, with thyme-like scattered *leaves*. The dried *flowers* are of a dull greenish-brown; their tube externally very silky; segments of the limb acute, one of them rather longer than the rest.

*P. gracilis*. Br. n. 33.—“*Leaves* oblong-linear, taper at the base; rather hairy beneath; some of them opposite on the branches. Heads lateral and terminal, of few flowers. *Calyx* silky; tube nearly straight; limb equal.”—Gathered by Mr. Brown in the south part of New Holland.

*P. latifolia*. Br. n. 34.—“*Leaves* oblong; acute and hairy at the base; rather silky beneath. Heads many-flowered, spiked; either terminal and sessile; or stalked and opposite to the leaves. *Calyx* villous.”—Found by Mr. Brown in the tropical region of New Holland. We have seen neither of these two last species.

PIMELIA, in *Entomology*, a genus of the Coleoptera order of insects. The generic character is as follows: antennæ filiform; four feelers; thorax plano-convex, margined head exerted; shells rather rigid; they are seldom found with wings. There are nearly 120 species enumerated by Gmelin, divided into sections, according as their

antennæ are moniliform, or entirely filiform; and these are subdivided according to the shape and structure of the feelers.

A. *Antennæ moniliform at the tip.*

a. *Feelers filiform.*

Species.

STRIATA. Black, glabrous; shells with four fanguineous striæ. It is a native of India. The body is gibbous; antennæ brown at the tip; shells united, the four streaks meeting at the tip.

UNICOLOR. Glabrous, black; the shells are marked with three raised obsolete lines. This is called the *Tenebrio gibbus* by Pallas. It is found at the Cape of Good Hope; as is the next.

FLAVICOLLIS. Glabrous, black; head white, villous behind.

GIBBA. Black; thorax globular; shells with an abbreviated lateral line. It is a native of India.

GLOBOSA. Thorax globular and very smooth; the shells are spinous behind. This is a native of the Cape.

LÆVIGATA. Oblong, black; thorax globular; shells very smooth, immaculate. It inhabits Hungary.

GLABRATA. Ovate, black; thorax globular; shells very smooth, immaculate. This is found in divers parts of Germany.

HISPIDA. Dull black; body rough, with erect stiff hairs. It inhabits Alexandria.

LONGIPES. Black; shells united, muricate; the legs are long. It is a native of several parts of Egypt.

RUSTICA. Thorax globular; grey; shells with a single raised angular line. It inhabits the Cape of Good Hope.

MURICATA. Black; shells obtuse, with muricate striæ. It inhabits southern Europe and the East.

TUBERCULATA. Black; thorax rough; shells with sub-spinous tubercles. It inhabits divers parts of Italy.

VARIOLOSA. Black; thorax smooth; shells with obtuse tubercles; the legs are long. It inhabits the Cape.

BI-PUNCTATA. Black; thorax globular, with two impressed dots; the shells are rugged, with three raised smooth striæ. This is a native of Italy.

SCABRA. Black; shells rough; the antennæ and legs are brown. This is found at the Cape.

GROSSA. Black; shells rough, with three smooth raised lines. It inhabits Barbary.

ANGULATA. Shells spinous, with a lateral raised ferrate line. It is a native of Alexandria.

ECHINATA. Thorax spinous at the sides; shells with raised spinous lines. It inhabits the Cape of Good Hope.

DENTATA. Thorax glabrous; body black; shells brown, with three raised ferrate lines. It inhabits the Cape.

PORCATA. Thorax smooth, polished; shells with three raised lines, the spaces between are rough, with raised dots.

MACULATA. Thorax black; shells cinereous, spotted with brown, with three raised lines; the second slightly waved. It inhabits the Cape.

SERRATA. Thorax variolous, shells with three raised lines; the interstices are rugged, and the legs long.

MINUTA. Thorax smooth and dusky; the shells are cinereous and rough, with three raised smooth lines.

RUGOSA. The thorax of this species rough; the shells are rugged, and narrower before.

SPINOSA. Thorax margined, spinous before and behind; the

## PIMELIA.

the shells are marked with raised smooth striæ. It is found in the south of Europe, and also in the East.

**ACUMINATA.** Thorax margined, the fore and hind margins are spinous; the shells are smooth and united. A native of southern Europe.

**REFLEXA.** Thorax margined, and reflected at the edges; the shells are muricate, with a single raised lateral line. Found in the East.

**FASCIATA.** Of this the thorax is sub-orbicular; the body is black; and the shells have two abbreviated yellow bands. It is an Indian insect.

**COLLABIS.** Black; shells smooth, with a single angle; the thorax is narrower than the shells; the head is depressed, carinate. Found in the southern parts of Europe.

**CARINATA.** Black; thorax orbicular; shells raised with three smooth lines. Inhabits the south of Europe.

**CILIATA.** Black; depressed; thorax and shells ciliate, the latter reflected at the edges. It is a native of the Cape.

**LINEATA.** Rounded and rough thorax; the shells have three lines of raised dots, and between these there are three lines. It inhabits Siberia.

**LEUCOGRAPHIA.** Rounded and rough thorax; shells cinereous, with nine black raised lines. It is a small insect, and found in Saxony.

**GLABRA.** Black; thorax rounded and smooth; the shells are very smooth. It inhabits Egypt, and varies very much in size.

**ANGUSTATA.** Glabrous; thorax narrowed behind; shells pointed. It inhabits the East. The body is entirely shining black.

**ORBICULATA.** Glabrous; thorax orbicular; shells pointed. It is denominated the *Tenebrio nomas* by Pallas. It is a native of the East.

**CEPHALOTES.** Thorax ciliate at the fore and hind edges; the shells are very rough, with four raised lines, the lateral ones carinate and subferrate. It inhabits the deserts of Ural.

**CONVEXA.** Black, smooth; thorax orbicular, convex, truncate before. It is found in divers parts of Europe and Africa.

**LINEARIS.** Black, smooth; legs ferruginous; antennæ very short. It inhabits Sweden.

**PUBESCENS.** Ovate, pubescent, opaque; shells with each four denticulate ribs. It is found in Egypt.

**ACRITA.** Thorax margined, dilated on the fore part; shells bicarinate, with two gibbosities. It inhabits Mauritania, as does the next.

**DIDYMA.** Thorax widely margined, two-horned behind; shells angular, with two gibbosities.

**CASPICA.** Ovate, slightly depressed; thorax excavated before and behind; shells carinate on each side, with alternate rough and smooth bands. A native of the Caspian sea.

**SUBGLOBOSA.** This, as its name imports, is subglobular; shells with smooth raised dots, and about four ribs, the outmost are carinate and crenulate. It is the *Tenebrio subglobosus* of Pallas. It inhabits southern France, and the deserts of Tartary. It moves very slowly, and is infested with the *Gordius*; and supposed to be a variety only of the *Pimelia rugosa*.

**SILPHIOIDES.** Sides of the thorax pointed behind, jagged before; shells with three smooth striæ. A native of Mauritania.

**TIBIALIS.** Black, smooth; fore-shanks compressed, one-toothed. It inhabits Africa and Spain.

**FEMORALIS.** Black, smooth; thighs thick, channelled beneath. It is found in divers parts of Germany.

**STRIATULA.** Black; shells ovate-oblong, striate. A native of Spain.

**LATICOLLIS.** Oval, depressed, deep black, smooth; thorax very broad, margined, excavated before, and truncate behind; the shells are substriate. Found at the Cape of Good Hope.

**VITTATA.** Gibbous, black; shells united, glabrous, with three scarlet striæ and sutures on each side; the legs are unarmed.

### b. *Feelers clavate.*

**GAGES.** Black; the thorax is a little rounded; the shells are mucronate and very smooth. Inhabits the southern parts of Europe. It resembles the *P. mortifaga*, but is twice as large.

**SULCATA.** Shells mucronate and grooved. It is found in the East; the shells are united with eight or nine smooth grooves. This insect is sold in Turkey as a specific against pains in the ears, and the bite of scorpions, and is boiled with butter, and eaten by the Turkish ladies for the purpose of making them grow fat.

**\*MORTIFAGA.** Black; shells mucronate, sub-punctured. Found in various parts of Europe, as well as in this country. This inoffensive animal is regarded as a presage of the death of one in the family, by the common people in Sweden, if it is seen crawling about the house.

**EXCAVATA.** Thorax angular behind; shells with indented dots, somewhat pointed. It is a native of Coromandel.

**GRANULATA.** Black, depressed; shells with sub-spinous tubercles. It inhabits the Cape of Good Hope, as does the next.

**BUPRESTOIDES.** Ovate, black; shells united and very smooth.

**DERMESTOIDES.** Black, ovate; shells obsolete striate; shield emarginate. It is a native of Saxony.

**OBTUSA.** Thorax angular behind; body black; shells obtuse, striate. It inhabits Coromandel. This is the *Blasis striata* of Fabricius.

**CAPENSIS.** Ovate, depressed, black; thorax with dilated margins; it has four fore-shanks one-toothed. Found at the Cape.

**EMARGINATA.** Black, shells with crenate striæ; lip emarginate. It inhabits Morocco.

**GRANULOSA.** Black; shells with three raised lines, and small raised dots between them; thorax emarginate. This is an African insect.

**SUBLEVIGATA.** Depressed, black; shells with three raised smooth lines. A native of Morocco.

**TRISTIS.** Black; shells grooved; the grooves smooth. Found in the sandy plains of Barbary.

**SERBATULA.** Thorax thickened at the edge; shells with three raised crenate lines. It inhabits the Cape of Good Hope.

**FEMORATA.** Black; hind-thighs channelled beneath, and covered with ferruginous down. A native of Germany.

**TIBIATA.** Black; shells striate; fore-shanks dilated and triangular. It is found at the Cape of Good Hope.

**CRENATA.** Thorax angular behind; of a grey-brown colour; shells with crenate striæ, obtuse. It inhabits Coromandel.

**HELOPHIOIDES.** Oblong, black; shells very smooth. It is an European insect.

**PUNCTATA.** Black; antennæ ferruginous; shells striate, and

and punctured. It is a native of the South American islands.

**CLATHRATA.** Black; shells latticed; antennæ ferruginous at the tip. It inhabits South America.

**SPECIOSA.** Subovate, bronzed, winged; shells highly polished, striate, with coppery and green lines. It inhabits Brazil.

**CHRYSOMELOIDES.** Ovate, very rough; thorax longitudinally ridged; shells with three tuberculate lines. A native of Mauritania.

**COSTATA.** Subglobular, roughish, opaque; shells with each three crenulate ribs, the outmost carinate. A native of Siberia.

**TORULOSA.** Ovate, subglobular; shells tuberculate, convex, without ribs. It is found at the Cape of Good Hope.

**AGRICOLA.** Pale rufous; head and thorax black. It inhabits Germany.

**SABULOSA.** Black; shells rugged, pointed behind. Found in France, as is the next.

**OCTO-STRIATA.** Black; shells with eight punctured striæ disposed in pairs.

B. *Antennæ entirely filiform.*

a. *Feelers four, filiform.*

**TRICUSPIDATA.** Thorax with three teeth before; the body is of a grey colour. It is an Arabian insect.

**SIMILIS.** Thorax dusky, with three teeth; disk of the shells whitish, with three brown lines. Found in Barbary.

**CRISTATA.** Thorax with three teeth, crested; body variegated. Found in Arabia.

**RETICULATA.** Thorax angular at the sides; shells reticulate. It inhabits the Cape of Good Hope; as do the two following.

**CORRUGOSA.** Thorax smooth; glossy-black; shells rugged, with a single raised line.

**VITTATA.** Thorax subangular; shells black, with two white fillets, and a single raised line.

b. *Fore-feelers hatched-shaped, hind-ones clavate.*

**LAMINATA.** Black; thorax nearly square, smooth; shells grooved; fore-shanks incurved, with a round ferruginous appendage at the tip. It inhabits India.

**PUNCTULATA.** Black; thorax square, the edges slightly toothed; shells striate, punctured. It inhabits India.

\***CÆRULEA.** Blueish; thorax suborbicular; shells striate. This is found in this country, and other parts of Europe.

**LANIPES.** Bronzed; shells ferrate and pointed. It is a native of Germany.

**MARGINATA.** Black; shells with a sanguineous edge all round. It inhabits Guinea. The shells are striate, black, with a blue gloss; the breast is rufous.

**ÆRUGINOSA.** Green bronzed; antennæ, shells, and legs black. Found at the Cape of Good Hope.

**BICOLOR.** Above dull brassy; beneath black; shells striate. It inhabits the South American islands.

\***SERRATA.** Black; claws ferruginous; feelers projecting. This is an English insect, and found in other parts of Europe.

**BARBATA.** Black; feelers projecting; legs yellowish. A native of Saxony.

**CANICULATA.** Black; thorax channelled, impressed on each side; the shells are striate; the feelers projecting. This is a native of Saxony.

**HÆMORRHOIDALIS.** Head and thorax azure; shells

green, with crenate striæ; the tail is rufous. It is found in India.

**LURIDA.** Black; antennæ and legs brown. Inhabits Brazil.

**LÆVIS.** Black; thorax channelled, tapering behind; shells smooth. It inhabits Saxony.

**EQUESTRIS.** Black; shells with an abbreviated gold band. It inhabits Brazil.

**MAURA.** Black; thorax rounded on each side, smooth; shells with indented dots. It inhabits the East Indies.

**MORIO.** Black; thorax square, smooth; shells with punctured grooves. It inhabits North America.

**NGRITA.** Black; thorax rounded at the edges; shells with crenate grooves. It inhabits Tranquebar.

**PICICORNIS.** Ovate, black; shells striate; antennæ and abdomen piceous. It inhabits the East Indies.

**RUFIPES.** Black; shells, antennæ, and legs rufous. Found in New Holland.

**LONGIPES.** Black; shells striate; legs long; second pair of shanks bearded. It inhabits the equinoctial parts of Africa.

**CAPENSIS.** Ovate, black; thorax smooth; shells striate. It inhabits the Cape.

**MARGINATA.** Ovate; thorax thickened at the edges; shells striate and smooth. It inhabits the Cape.

**ATRA.** Black; shells striate; antennæ and legs brown. It is a native of Germany.

\***ANGLICA.** Black; thorax rounded before; shells striate, punctured; antennæ rufous at the tip. It is a rare insect, but a native of England.

**HOTTENTOTA.** Black; shells with crenate striæ. This is found in France.

**BANKII.** Black; shells grooved, punctured; fore-thighs sharply toothed. It is found in Coromandel.

**UNDATA.** Black; thorax rufous, with black spots; shells rufous, with waved black bands. It inhabits Cayenne.

\***QUISQUILIA.** Black; antennæ and legs ferruginous. It inhabits divers parts of Europe, and is found in filth and manure.

**FLAVIPES.** Brown; mouth, antennæ, and legs ferruginous; shells with crenate striæ. It inhabits the South American islands.

**RUFICOLLIS.** Ferruginous; shells striate, black. It inhabits Saxony.

**CYANEA.** Blue; thorax punctured; shells striate. It inhabits Germany.

**VIOLACEA.** Cylindrical, varied with fine polished blue and violet; abdomen red behind; shells striate, punctured.

**LEUCOGRAPHIA.** Ovate; thorax very rough, uneven; shells carinate, rough, with longitudinal, whitish, smooth stripes.

**BUPARIA.** Winged, black, glabrous; thorax lunate; jaws strong, toothed, as long as the head. It inhabits Spain, is described to be of the size of *Lucanus interruptus*, and it resembles the *Tenebrio fossor*.

**PIMENI**, in *Geography*, a town of Naples, in Calabria Ultra; 17 miles N.E. of Nicotera.

**PIMENTA**, or **PIMENTO**, in *Botany*, *All-spice*, or *Jamaica Pepper*, a species of the *Myrtus*, the *Myrtus pimenta*. (See **MYRTUS**.) It grows plentifully on the hilly parts of Jamaica, and is much cultivated there; because of the great profit from the cured fruit sent in great quantities yearly into Europe.

It flowers in June, July, and August, sooner or later, according to its situation and the different seasons for rain; and after its flowers, the fruit soon ripens. The flowers, with every part of the tree, breathe an aromatic fragrance.

Its

Its fruit is called *all-spice*, from its taste being supposed to resemble that of many different species mixed together.

There is little difficulty in curing and preserving this fruit for use, which is done thus: the negroes climb the trees and pull off the twigs with the unripe green fruit, and afterwards carefully separate the fruit from the twigs, leaves, and ripe berries; which done, they expose them to the sun from its rising to setting, for many days, spreading them thin on cloths, turning them now and then, and carefully avoiding the dews. By this management they become a little rugose or wrinkled, dry, and from a green change to a brown colour, and then they are fit for the market.

The ripe berries are very carefully separated from those to be cured; because their wet and plenteous pulp renders them unfit for cure.

The berries that are fully ripe lose the aromatic warmth for which they are so much esteemed, and acquire a taste perfectly resembling that of juniper berries, which renders them an agreeable food for the birds, the most industrious planters of these trees, which devouring them greedily, and muting the seeds, afterwards propagate these trees in all parts of the woods.

After the above described process is completed, which is known by the colour and rattling of the seeds in the berries, they are put up in bags or hogsheads for the market. The aromatic odour and warm pungent taste of the pimento are qualities, which reside chiefly in the capsule, or rather cortical part of the dried berry. Its virtues are extracted by water, alcohol, and ether. The watery infusion is of a brown colour, and reddens litmus infusion. With solution of sulphat of iron it immediately strikes a deep black colour, and slowly lets fall a precipitate. Nitrate of mercury precipitates it of a yellowish-brown; superacetate of lead of a dirty green; and nitrate of silver of a deep reddish-brown colour. It also forms a precipitate with the infusion of yellow cinchona bark. The sulphuric and muriatic acids redden it, and throw down pale rose coloured precipitates. The nitric acid forms no precipitate, but gives it a yellow hue. The alcoholic tincture is rendered milky, and after a time precipitated by water; the ethereal, when evaporated in water, deposits drops of a greenish-yellow volatile oil, a pellicle of a pungent nauseous-tasted resin, and some extractive. Hence pimento appears to contain a volatile oil, resin, extractive, tannin, and gallic acid.

For dietetic purposes; to which it is chiefly applied, it is accounted the best and most temperate, mild, and innocent of common spices, and fit to come into greater use, and to gain more ground than it hath yet done. It surpasses most of the East Indian aromatics in promoting the digestion of meat, attenuating tough humours, moderately heating, strengthening the stomach, expelling wind, and doing those friendly offices to the bowels, we generally expect from spices. Phil. Trans. N<sup>o</sup> 192.

This spice has been also long employed in the shops as a succedaneum to the more costly oriental aromatics. Distilled with water, it yields an elegant essential oil, so ponderous as to sink in water, in taste moderately pungent, in smell and flavour approaching to oil of cloves, or a mixture of those of cloves and nutmegs: the remaining decoction, inspissated, leaves an extract somewhat ungrateful but not pungent. To rectified spirit it imparts, by maceration or digestion, the whole of its virtue, together with a brownish-green tincture. In distillation it gives over very little to this menstruum, nearly all its active matter remaining concentrated in the inspissated extract.

Pimento is stimulant and tonic. It is useful as an adjunct to bitters in dyspepsia attended with much flatulence,

and in arthritic and hysterical affections. The watery infusion of it sweetened with sugar, and with the addition of a little milk, is readily taken by children, and serves as an excellent cordial in malignant measles, scarlatina, confluent small-pox, and the other exanthemata, when the fever assumes the typhoid type. But its principal use in medicine is to cover the disagreeable tastes of other remedies, or to give them warmth. The dose of the berries is from grs. v to ℥ij in powder, or in their entire state. The official preparations are the following; viz. Aquapimenta, L. E. D. Oleum pimentæ, L. E. D. Pilulæ opiatæ, E. Spiritus pimentæ, L. D. Syrupus rhamni, L.

The "Aqua pimentæ" of the London college, "Aqua myrti pimentæ," Edinb., "Aqua pimento," Dub., or pimenta water, is prepared by macerating half a pound of pimenta berries bruised in a pint of water for 24 hours; and by distilling with a sufficient quantity of water to prevent empyreuma, a gallon (10 pounds, Edinb.)

This water has the odour and aromatic quality of the Jamaica pepper, but it is not very agreeable to the taste. It is used as a carminative in dyspepsia.

"Oleum pimentæ," L. E. D. (see OIL of Jamaica Pepper), "Pilulæ opiatæ," (see PILLS, Opiate), "Spiritus pimentæ," L., "Spiritus pimento," Dub., Spirit of pimenta, is prepared by macerating for 24 hours two ounces (three ounces, Dub.) of pimenta berries bruised in a gallon of proof spirit, with water sufficient to prevent empyreuma; and then distilling a gallon by gentle heat. "Spiritus fructus myrti pimentæ," Edinb., Spirit of pimenta, is prepared with half a pound of bruised pimenta berries, in the same manner as spirit of caraway. This is an useful carminative in flatulent colic, atonic gout, and dyspepsia.

Syrupus *Rhamni*. See SYRUPUS RHAMNI.

PIMERIA, in *Geography*, a province in the domain of New Biscay, so called from the Pimas, a savage tribe. It is divided into two districts, the higher and the lower, and extends more than 100 leagues to the N. of Sonora. The savages here are rather pacific, and friends of the Spaniards. The climate is moist and cold, the rains being sometimes continued during a whole week in winter, while many torrents descend from the Sierra Madre. The Spaniards have left this province almost a desert, on account of the frequent invasion of the Apaches.

PIMOCHA, a town of South America, in the audience of Quito; 36 miles N.N.E. of Guayaquil.

PIMOLISA, in *Ancient Geography*, a fortified place of Cappadocia, in Pontus, on this side of the river Halys, and which gave name to the country of "Pimolifena," in the environs of this river.

PIMP-TENURE, in *Law*, a kind of tenure mentioned in our old writers, "Willielmus Hoppeshort, tenet dimidium virgatum terræ, per servitium custodiendi sex damifellas scilicet meretrices, ad usum domini regis." 12 Ed. I.

PIMPELGONG, in *Geography*, a town of Hindoostan, in the circle of Kitchwara; 15 miles E. of Saurungpou.

PIMPERNEL, in *Botany* and the *Materia Medica*. See ANAGALLIS.

PIMPERNEL, *Water*, a species of speedwell or *veronica*; which see.

PIMPERNEL, *Round-leaved Water*. See SAMOLUS.

PIMPERNEL, *Yellow, of the Woods*. See LYSIMACHIA.

PIMPINELLA, is supposed by Ambrosinus, whose opinion is adopted by Linnæus, to be a corruption of *bipinella*, or *bipennula*, words expressive of the pinnate, or feather-like, structure of the foliage. Linn. Gen. 145. Schreb. 195. Willd. Sp. Pl. v. 1. 1471. Mart. Mill.

Diët.

## PIMPINELLA.

Diät. v. 3. Sm. Fl. Brit. 331. Ait. Hort. Kew. v. 2. 159. Juss. Lamarck Illustr. t. 203. (Anisum; Gært. t. 23.)—Class and order, *Pentandria Digynia*. Nat. Ord. *Umbellatae*.

Gen. Ch. *General umbel* of numerous rays; *partial* of still more. *General and partial involucre* wanting. *Perianth* scarcely discernible. *Cor.* Universal nearly uniform; flowers all fertile; *partial* of five, nearly equal, inflexed, heart-shaped petals. *Stam.* Filaments five, simple, longer than the petals; anthers roundish. *Pist.* Germen inferior; styles two, very short; stigmas capitate, nearly globose. *Peric.* none; the fruit ovate-oblong, separable into two parts. *Seeds* two, oblong, contracted towards the top, convex and striated on the outer side, flat on the inner.

Eff. Ch. *General and partial involucre* wanting. *Petals* uniform, inflexed. *Fruit* ovate-oblong, striated. *Stigmas* nearly globose.

1. *P. saxifraga*. Common Burnet-Saxifrage. Linn. Sp. Pl. 378. Fl. Dan. t. 669. Jacq. Austr. t. 395. Engl. Bot. t. 407. (*Bipinella*, five *Saxifraga* minor; Ger. Em. 1044.)—Leaves pinnate, variously cut; the radial leaflets roundish; the uppermost linear. *Seeds* smooth.—Native of dry gravelly or lime-stone pastures and hills, in various parts of Europe; frequent in England, flowering in July and August. The *root* is perennial, woody, aromatic, very hot and pungent. *Herb* roughish, and somewhat downy. *Stems* erect, rigid, round, striated, rather zigzag; the flowering branches elongated, and nearly naked. The leaflets of the radical *leaves* are ovate, obtuse, or roundish, very deeply and irregularly cut, some of them, from the same root, doubly pinnatifid in the most regular manner; the *leaves* on the upper part of the stem are simply pinnatifid, and linear; and the uppermost of all minute, as if abortive, consisting of little more than a lanceolate, concave, membranous *footstalk*. The *umbels* are terminal, solitary, naked, and smooth, with angular stalks. *Flowers* small, white or cream-coloured, almost perfectly regular. *Stigmas* capitate, which is unfortunately omitted in Engl. Bot., some of the *flowers* being occasionally found incomplete in that respect, as there represented. *Seeds* small, striated, smooth, crowned with the fleshy receptacle of the flower. *P. diffusa*. Retz. Obs. fasc. 3. 30. t. 2. Willd. n. 4. Ehrh. Herb. 42; appears to us a mere variety, with triply pinnatifid leaves. Ehrhart's specimen, at least, is not specifically different from *saxifraga*, except in its smooth stem, a variable character.

2. *P. nigra*. Black-rooted Burnet-Saxifrage. Willd. n. 2. Berolin 110. (*Saxifraga hircina* minor, foliis sanguiforbæ; Bauh. Hist. v. 3. part 2. 111.)—Stem striated, hairy. *Leaves* pinnate, downy; the radical ones with inversely heart-shaped, cut, obtusely toothed leaflets; those on the stem bipinnate, their leaflets wedge-shaped, toothed.—Native of dry ground in Germany. We know it not, but we follow Willdenow's *Prodromus Berolinensis*, in preference to his Sp. Pl., in the character, as agreeing best with Roth's Fl. Germ. v. 2. 342. The latter author describes "the terminal leaflet of the radical *leaves* constantly three-lobed." So it often is in *P. saxifraga*. The *root* of *P. nigra* is said to discharge a blue milky fluid, when wounded.

3. *P. magna*. Great Burnet-Saxifrage. Linn. Mant. 2. 219. Willd. n. 3. Engl. Bot. t. 408. (*P. major*; Hudf. 127. Fuchf. Hist. 608. Jacq. Austr. t. 396. *P. saxifraga*; Ger. Em. 1044. Matth. Valgr. v. 2. 379.)—Leaves pinnate; leaflets ovate, pointed, cut; the terminal one three-lobed. *Stem* angular, furrowed, smooth.—Native of various parts of Europe. Found with us chiefly on

a chalky or lime-stone soil, in rather hilly places, flowering in July and August. The *root* is larger than that of the first species, but weaker in flavour and qualities. Whole plant larger, distinguished by the uniformity of its *leaves*, which are pointed, and doubly ferrated, smooth, and of a lighter green. *Stem* smooth, remarkably angular and furrowed. *Umbels* large, always white in England. Jacquin represents them of a pale blush, though he describes them as generally white, except in subalpine situations. On the alps of Switzerland, France, Savoy, &c. this species is always found with beautiful pink *flowers*. This is *P. flore rubro*; Riv. Pentap. Irr. t. 81. We have often, in contemplating its beauty, wished to detect some specific distinction, but in vain. Another acknowledged variety, though much differing in habit, is *P. orientalis*, Gouan. Illustr. 21. t. 15. Jacq. Austr. t. 397. (*Pimpinella*; Riv. Pentap. Irr. t. 80.)—In this most of the *leaflets* are deeply, and even doubly, pinnatifid, with linear-lanceolate, entire, not ferrated, segments. Without the radical *leaves*, which agree with the common appearance of *P. magna*; and the weighty authority of Jacquin, who has traced its variations; few persons would believe this to be but a variety. Willdenow ought to have marked it  $\gamma$ , as differing from his  $\beta$ .

4. *P. Tragium*. Downy-seeded Burnet-Saxifrage. Villars Dauph. v. 2. 605. (*Tragium alterum* Dioscoridis; Column. Phytobas. 75. t. 76. ed. 2. 61. t. 17, excluding Tournefort's synonym.)—Leaves pinnate; leaflets wedge-shaped, cut; the uppermost linear and entire. *Seeds* downy.—Found by Villars near Grenoble, at the foot of the mountain of St. Juste, near St. Paul of the three castles, amongst red ochry sand and fossil shells. We have a specimen from M. Thouin. Authors have passed over this species, though it appears to us very distinct, especially in its downy *seeds*, which serve to ascertain the synonym of *Columba*, though his plate must surely have been taken from a specimen of *P. saxifraga*; at least his *leaves*, except that on the middle of the stem, give no idea of our plant. The *root* of *P. Tragium* is woody, branched at the top, very pungent. *Stems* from six to twelve inches high, branched, spreading, round, striated, downy, almost leafless. Radical *leaves* numerous, simply pinnate, two inches long, rigid, minutely downy; wedge-shaped, not rounded, very acutely cut into about three segments. Villars says the leaflets of the first year's growth are more rounded. *Umbels* finely downy. *Stigmas* capitate. *Seeds* ovate, angular rather than striated, uniformly covered with fine, short, dense pubescence.

5. *P. bubonoides*. Round-leaved Burnet-Saxifrage. Broter. Lusit. v. 1. 462. Phytogr. fasc. 1. 41. (*Apium macedonicum*; Lusit. Grisl. Virid. 19, excluding the synonym. *A. lusitanicum rotundifolium*; Tourn. Int. 305.)—Leaves twice or thrice pinnate, rounded, obtuse, crenate. *Stem* panicled. *Umbels* and *seeds* downy.—Native of sandy barren places in Portugal. Brotero. Loeffling sent specimens from St. Ubes, with Tournefort's synonym, to Linnæus, who laid them undetermined into his genus of *Bubon*. We have others gathered by the Abbé Durand, in July, near Salée in Barbary. This is a striking and most distinct species, with all the characters of a *Pimpinella*. *Root* perennial, acrid, externally green. *Stem* often solitary, sometimes three or four from one root, herbaceous, annual, twelve or eighteen inches high, round, downy, thickish, much branched, and panicled, bearing a multitude of white *umbels*, very downy in every part; the *branches* and *stalks* accompanied by broad, solitary, ovate, often recurved *bracteas*, or rather abortive leaf-stalks. Radical *leaves* large, green, finely veined, slightly downy, twice or thrice pin-

nate; each leaflet near an inch long, rounded and obtuse, strongly crenate; oblique, entire, and cut away, as it were, at the base.

6. *P. capensis*. Cape Burnet-Saxifrage. Thunb. Prodr. 51. Willd. n. 6.—“Leaves thrice compounded; their segments acute. Stem striated.”—Found at the Cape of Good Hope.

7. *P. peregrina*. Nodding Burnet-Saxifrage. Linn. Sp. Pl. 378. Willd. n. 7. Ait. n. 4. Jacq. Hort. Vind. v. 2. 61. t. 131. (*Daucus tertius* Dioscoridis, secundus Plinii; Column. Ecphr. 108. t. 109.)—Radical leaves pinnate, rounded, crenate; upper stem-leaves wedge-shaped, cut. Young umbels pendulous. Seeds hispid.—Native of Italy, Spain, and France. Cultivated by Parkinson in 1640. Root perennial, spindle-shaped, white, aromatic and acrid. Stem eighteen inches high, erect, round, downy, not much branched. Radical leaves simply pinnate, rounded and crenate; the rest composed of narrow wedge-shaped leaflets; all somewhat rough or downy. Umbels few, large, white, perfectly pendulous, as if dying, before the flowers expand. Seeds ovate, minutely bristly.

8. *P. Anisum*. Anise. Linn. Sp. Pl. 379. Willd. n. 8. Ait. n. 5. Woodv. Med. Bot. t. 180. (*Anisum*; Riv. Pentap. Irr. t. 73. Ger. Em. 1035.)—Radical leaves three-cleft; stem-leaves acutely lacinated. Germs downy.—Native of Egypt. A hardy annual, but seldom ripening its seeds plentifully in our gardens. What are required for medical use, as an agreeable aromatic and cordial, are imported from Spain and Malta. The herb is a foot high, branched, slightly rough or downy, known by its jagged sharp leaves. Umbels always erect, white.

9. *P. dichotoma*. Fork-leaved Burnet-Saxifrage. Linn. Mant. 58. Willd. n. 9.—Leaves repeatedly compound, linear, channelled, acute. Footstalks with a membranous dilated wing. Stem paniced. Seeds globose, rough.—Native of Spain; sent by Loeffling to Linnæus, who alone has described it, nor do we find it any where figured. The stem is about a foot high, very much branched and paniced, with numerous white umbels. Leaves fleshy, roughish, in narrow channelled subdivisions, so that this species might well have been termed *abrotanifolia*. Their broad footstalks are conspicuous for a fine, broad, membranous, snow-white border.

10. *P. dioica*. Dwarf Burnet-Saxifrage, or Rock Parsley. Linn. Syst. Veg. ed. 13. 241. Willd. n. 10. Engl. Bot. t. 1209. (*P. pumila*; Jacq. Austr. t. 28. *P. glauca*; Linn. Sp. Pl. 378. Willd. n. 5. *Seseli pumilum*; Linn. Sp. Pl. 373. *Peucedanum pumilum*; Ger. Em. 1054.)—Leaves twice or thrice compound, linear, smooth. Umbels paniced. Flowers dioecious. Seeds ovate, smooth.—Native of Italy, Switzerland, France, and Austria; found on lime-stone rocks, in the south of England, but rarely. We no longer scruple to unite all the above synonyms of Linnæus, on the authority of his own specimens. This species is of humble growth, smooth, glaucous, with a stout, zig-zag, striated, purplish stem, divided into many alternate spreading branches. The umbels are disposed in a paniced manner, on reddish stalks. Flowers white, perfectly dioecious in effect, though not entirely in structure. Seeds roundish-ovate, striated, quite smooth. Dr. Wade has met with this rare plant, in great abundance, in pastures near the church of Athby, county of Meath, Ireland. Dr. Sibthorp found it on the summits of mount Athos, and the Bithynian Olympus.

PIMPINELLA, in *Gardening*, contains a plant of the annual kind, of which the species cultivated is the anise (*P. anisum*).

In these plants the seeds have an aromatic smell, and a pleasant warm taste, accompanied with a considerable degree of sweetness.

*Method of Culture*.—The seeds should be sown in the early part of April, on a dry warm border, where the plants are to remain; being afterwards properly thinned out, and kept free from weeds. These plants, however, seldom afford much profit by their seeds in this climate.

They produce variety in the borders, &c. of pleasure-grounds, as well as in pots in other places, when cultivated in that way.

PIMPLA, or PIMPLEUS, in *Ancient Geography*, one of those mountains which separated Macedonia from Thessaly, and which were consecrated to the Muses.

PIMPLE, in *Medicine*, a small pustule arising on the face.

By mixing equal quantities of the juice of house-leek, *sedum minus*, passed through paper, and of spirit of wine rectified by itself, a white coagulum of a very volatile nature is formed, which Dr. Burghart commends for curing pimples of the face; and says, that the thin liquor separated from it, with sugar-candy, is an excellent remedy for thick viscid phlegm in the breast. Satyr. Silesiac. Spec. 4. Ob. 2.

PIMPRAMA, in *Ancient Geography*, a town of India, towards the source of the river Indus, according to Arrian.

PIMSAN-IM, in *Geography*, a town of Chinese Tartary; 35 miles S.W. of Ning-yuen.

PIN, in *Commerce*, a little necessary implement, chiefly used by the women in adjusting their dresses.

The form and application of this little article need no description; but its consumption, and the number of hands it employs, are too considerable to be passed by unnoticed.

Pins are now mostly made of brass-wire: formerly they likewise made them of iron-wire, which, being blanched, like the others, passed for brass; but the ill effect of those pins has almost altogether discarded their use. The French, however, could not be driven off from them without several arrears of parliament. By a sentence of the lieutenant de police, July 1695, the seizure of some millions of those pins was confirmed, and the pins condemned to be burnt by the common executioner.

The pins most esteemed in commerce are those of England. The method of manufacturing this useful article, that has been long practised, is as follows. The brass wire, of which these implements are now almost wholly made, is generally too thick for being cut into pins. It is, therefore, reduced in size, by causing it to pass through a small hole in a piece of iron. When it has been reduced to a proper size, it is straightened, and subsequently cut into proper lengths; and again afterwards cut into smaller ones, each length being sufficient for making several pins. Each end of these pieces is pointed, so as to be sharp enough for penetrating, without difficulty, through linen, paper, &c. by either men or boys, seated before two small grinding-stones, or steel-mills, that are turned by a wheel, either by means of machinery or of the hand. These stones, or steel-mills, are used for making the rough point, and for smoothing them; and, therefore, they are careful to turn the wire, so as to render the points uniform and regular. The pin is afterwards cut off to the length that is wanted, from each end; and the process is repeated; till the whole of the length is pointed. The manufacture of the head is performed by the following operations. A piece of wire, suitable for heads, is spun on another; and thus the inside wire occasioning the upper

upper wire to be hollow, when drawn off, is then in the state required for being cut into heads: this is done by shears, every two rounds of the wire making a single head. The next process is that of heading the lengths, which is done by the operators or work-people taking up a single length, and thrusting it among the heads, and then immediately placing it under a heavy weight or hammer; when receiving the necessary blow, it is made secure; and thus the pin is completed in the first state. After this it is to be blanched or whitened, which is accomplished by putting the pin in a copper, containing tin and the lees of wine. When this is completed, the pin is in a state for sale, at the option of the buyer, either in a loose state, or stuck in paper for the convenience of the consumer.

Some successful attempts have been lately made by the well-known manufacturers, Messrs. Durnford, Francis, and Co., of Gracechurch-street, London, for putting on the heads of this very useful little article, with greater expedition and uniformity than had been previously done by others. We are not at liberty to disclose the process, which is ingenious, practicable, and expeditious; but to every effort for the improvement of this, and of every other article of British manufacture, we cannot but wish success.

The perfection of pins consists of the stiffness of the wire, and its blanching; in the heads being well turned, and the points filed.

The London pointing and blanching are in most repute; because our pin-makers in pointing use two steel-mills, (which are also occasionally used in the country,) the first of which forms the point, and the latter takes off all irregularities, and renders it smooth, and as it were polished; and, in blanching, use block tin, granulated: whereas in other parts they use a mixture of tin, lead, and quicksilver; which not only blanches worse than the former, but is also dangerous, on account of the ill quality of that mixture, which renders a puncture with a pin thus blanching very difficult to be cured.

The consumption of pins, and the number of artificers employed in the manufacture of them, are incredible. In Paris alone, there were anciently above one thousand people employed in it; and after the decline of this manufacture in the city, there have been annually sold above fifty thousand crowns worth of the pin-wire to the pin-makers of the neighbouring places, all brought thither from Stockholm. In the little town of Rugle, in Normandy, there were computed at least five hundred workmen employed in the pin manufacture; the whole town being peopled with them. Several thousand persons are employed in this manufacture, in various parts of our own country. Establishments of this kind are to be found in the Metropolis, Warwickshire, Gloucestershire, Essex, &c.

Notwithstanding that there is scarcely any commodity cheaper than pins, there is not any one that passes through more hands before they come to be sold. They reckon twenty workmen successively employed in each pin, between the drawing of the brass-wire, and the sticking of the pin in the paper.

Pins are distinguished by numbers; the smaller called from N<sup>o</sup> 3, 4, 5; thence to the 14th; whence they are only accounted by two to two, viz. N<sup>o</sup> 16, 18, and 20, which is the largest size.

Besides the white pins, there are also black ones made for mourning, from N<sup>o</sup> 4, to N<sup>o</sup> 10. These are usually of iron-wire.

Lastly, there are pins with double heads, of several numbers; used by the ladies to fix the buckles of their hair for the night, without danger of being disturbed by their pricking, &c.

The manufacture of both brass and iron pins is thought by some persons to be in a degree injurious to the pointer; as it is imagined he imbibes, in the course of some years, a quantity of the dust which flies off the wire, and which, in that case, must be pernicious. He is also liable, from the constant pressure of his thumb on the stones, to a weakness in it, which not unfrequently renders him incapable of continuing the operation of pointing.

We are sorry to learn that the pin manufacture is less prosperous than it was some years ago. This decline is partly owing to the diminished consumption of this article by our fair country-women, and of course partly to the excess of the quantity made above the regular demand; which has occasioned to the master-manufacturer not only an inconvenience, but a disproportionate return of profit for the capital which it employs. Upon the whole, it is thought, that this useful class of persons is decreasing in number; and that there are no very encouraging expectations of the manufacture's soon reviving and flourishing.

The first mention of pins that occurs in the English statute-book, is found in the statute of Richard III. in 1483, prohibiting foreign manufactures; and it appears from the manner in which pins are described in a statute of the 34th and 35th of Henry VIII. cap. 6, A. D. 1543, and the labour and time which the manufacture of them would require, that they were a new invention in this country, and probably but lately brought from France. However, in about three years time, they fell into the present ingenious and expeditious manner of making them.

One of the articles of the statutes of the ancient pin-makers of Paris was, that no master should open more than one shop for the sale of his wares, except on new-year's day, and the eve thereof: this we mention in an age of luxury and profusion, to recollect the agreeable simplicity of our forefathers, who contented themselves with giving pins for new-year's gifts.

Hence the custom of still giving the name *pins*, or *pin-money*, to certain presents, which accompany the most considerable bargains; in which it is usual to give something towards the pins of the wife, or children, of the person with whom the bargain is struck.

**PINS, Hook.** See **HOOK**.

**PINS, Protracting.** See **PROTRACTING**.

**PIN**, in *Artillery*, &c. an iron nail or bolt, with a round head, and generally with a hole at the end to receive a key. Of this there are many sorts, as axletree-pins, or bolts, bolster-pins, pole-pins, swing-tree-pins, &c. Musket-pins are small pieces of iron or wire that fasten the stock.

**PINS, Belaying**, in *Block-making*, are wooden pins, turned in a lathe, made of ash, 16 inches long, and  $1\frac{1}{8}$  diameter at the upper end, which is turned as a handle; is  $\frac{2}{3}$ th the length, then shouldered in to  $1\frac{1}{4}$  inch diameter.

**PINS of Blocks** are made of lignum-vitæ, or cocus; and sometimes, for common blocks, of green-heart, a wood which is imported from the West Indies. The diameter of the pin is the thickness of the sheave, and is turned in a lathe, except the head, which is left eight-square, to prevent its turning in the block, and is driven through the holes in the block and sheaves. Brass, iron, and lignum-vitæ sheaves, that are coated or plated, have iron-turned pins with square heads, and sometimes a hole in the point, for a forelock, to prevent their coming out. After the sheaves are fitted, the inside of the sheave-hole, at the arse of the block, is gouged hollow, to admit the rope, and answer with the sheave; and a small neat chamfer taken off the edges. See **BLOCK**.

**PINS**, in *Skip Building*, are various, according to their se-

veral purposes; such are the bitt-pins, belaying-pins. Pins to prevent the bars of the capstan unshipping, are of iron, with an eye and a shoulder in their upper end. Connected with the eye is a short chain, fixed to the drum-head: thus they are always ready, when wanted, to put through the ends of bars, when shipped.

*PINS of Boats*, are pins of iron or hard wood, fixed along the gunwales of some, instead of row-locks, whose oars are confined by grommets; such are whale-boats, that occasionally row either end foremost. Pins and plates are iron pins, fitted in plates at convenient distances in the side of the pall-head of capstans, and occasionally drawn out to support the palls of the capstan.

*PIN-Fallow*, in *Agriculture*, a provincial term applied to a winter fallow.

*PIN-Money*, the name given to that allowance usually made by the husband to his wife, for her own spending.

*Ad PINNAS bibere*, a method of drinking anciently used among the Danes in England. The custom was, to fix a pin in the side of the wooden cup or wassal-bowl; which pin each guest was to drink bare, upon penalty of forfeiting.

*PIN and Web*, a horny induration of the membranes of the eye, not much unlike a cataract.

The pin and web is the same with what we otherwise call the pannus, unguis, pterygium, &c.

*PIN Wheel of a Clock*, the same with the striking wheel. See *WHEEL* and *CLOCK*.

*PIN*, in *Geography*, a city of China of the second rank, in the province of Chan-tong; 170 miles E.S.E. of Peking. N. lat. 37° 34'. E. long. 117° 40'.

*PINA, RUY DE*, in *Biography*, one of the earliest and best Portuguese historians, who flourished in the latter part of the 15th and half the 16th centuries. He was employed by Joan II. in many embassies of confidence and honour, signed the will of the monarch as public notary, was present at his death, and was the person who opened and publicly read his will. Emanuel heaped more favours upon him, and made him chief chronicler, an office of which he had already performed the duties. He lived some years after the death of this monarch, but the time neither of his birth nor of his death has been ascertained. He is supposed to have written the chronicles of Sancho I. and II., Alfonso II. III. IV. and V., of Diniz and Joam II. Some of these are disputed, and said to be the production of Fernam Lopes. Joam III. commissioned him to write the chronicle of his father Emanuel, for which he had collected materials, as the mighty events of that extraordinary reign took place. The celebrated Albuquerque, looking to him as the historian of his victories, sent him a present of jewels. "He," said his rival, Damian de Goes, "had the ruby rings, and I had the trouble." "Ruy de Pina," says Mr. Southey, "might have been called a chronicler of first rate merit, if Fernam Lopes had never written, who is infinitely the best of all chroniclers. But though coming immediately after that incomparable writer, Ruy de Pina still appears an excellent historian, and far superior to all who followed him."

*PINACIA*, Πινάκια, among the Athenians, tablets of brass, whereon the names of all the persons in each tribe duly qualified, and willing to be judges, or senators of the areopagus, being severally written, they were cast into a vessel provided on purpose; and into another vessel were cast the same number of beans, a hundred of which were white, and all the rest black; then the names of the candidates and the beans were drawn, one by one; and

those whose names were drawn out together with the white beans, were received into the senate. See *PROBULEUMA*.

In Solon's time there were only four tribes, each of which elected a hundred senators; so that the areopagus consisted of four hundred members; but the number of tribes being afterwards increased, the number of senators was consequently augmented by some hundreds; but the manner of election remained the same. See *AREOPAGUS*.

*PINACLE, LA*, in *Geography*, a cape on the W. coast of the island of Jersey; one mile S. of Grones.

*PINACOTHECA*, among the *Ancients*, a place where pictures, statues, and other curiosities were kept.

*PINAGRA*, in *Geography*, a strong mud-fort of Hindoostan, in Baramaal, taken and destroyed by the British in 1790; 14 miles W.S.W. of Darempour.

*PINANG*, the name of the kernel of the arca nut, and also a preparation made in the East Indies of this nut, or the mixture of the ingredients which they use for mastication. Into one of the Siri or betel leaves, a piece of the arca nut, which is generally divided into six parts, one of which serves at a time, being put, with a little lime, the leaf is folded together, and kept in the 'mouth till the whole strength is drawn out of it. See *BETEL*.

*PINANG*, or *Pulo-Pinang*. See *PRINCE of Wales island*.

*PINANPIRO*, a town of South America, in the province of Quito; 10 miles N.N.E. of Quito.

*PINARA*, in *Ancient Geography*, a town of Asia Minor, being one of the largest in Lycia. It is placed by Strabo in the interior of this province, at the foot of mount Cragus.—Also, a town of Asia, in the northern part of Cælefyria, upon the Gindarus, according to Pliny. Ptolemy places it in Pieria of Syria.—Also, an island of the Ægean sea, upon the coast of Ætolia.

*PINARII*, among the Romans, an order of priests belonging to Hercules, who offered sacrifices to that god in a solemn manner every year. They were in this service connected with the Potitii.

*PINARUS*, in *Ancient Geography*, a river of Asia, which rose in mount Amanus, and pursuing its course between two chains of these mountains, discharged itself into the Mediterranean, in the strait where was the bay of Issus, in the gulf of Illicus.

*PINAS, JOHN*, in *Biography*, a painter of history, portrait, and landscape, born at Haerlem about the year 1596. He travelled to Italy for improvement, and afterwards obtained considerable reputation. He had a brother of the name of Jacques, who practised in the same style as John, but not with equal success.

*PINAS*, in *Geography*, a town of Spain, in Catalonia; 17 miles N.N.W. of Motril.

*PINAS Island*, an island on the coast of the gulf of Honduras, situated off Trivigillo bay.

*PINAS Point*, the eastern point of Panama bay. N. lat. 6° 15'. W. long. 80° 30'. The port of this name is on the same S.W. coast of the isthmus of Darien, near the point. The whole coast southward to cape Corientes abounds with pine-trees, whence the name.

*PINASTELLA*, in *Botany*, Dill. Giff. 168, so called by that author from its fancied resemblance to a pine-tree in miniature. See *HIPPURIS*.

*PINCH*, in *Music*, a kind of grace proper for certain instruments, particularly the harpsichord; it is formed by striking alternately the sound of the written note with the sound of the inferior note, and observing to begin and finish with the note which bears the pinch. The difference between the pinch and trill is this, that the latter is struck with the superior note, and the pinch with the inferior.

To PINCH, is to use the fingers instead of the bow, to make the chords of an instrument found. There are some chord instruments which have no bow, and which are played only by pinching, as the lute, guitar, &c. and sometimes those with which the bow is generally used are pinched, as the violin, and violoncello; and this method of playing is marked in the Italian by the word *pizzicato*.

PINCHBECK, in the *Arts*, an alloy of copper and zinc, in various proportions. The copper in all these alloys should not be in less proportion than two of copper to one of zinc. This is scarcely malleable. The proportions in all cases should be definite. In the instance of these two metals proper compounds will be 1 to 1, 2 to 1, 3 to 1, &c. Any intermediate alloy will be defective. See *GOLD-coloured Metal*.

PINCHE, in *Zoology*, the *SIMIA Oedipus*; which see.

PINCHESES, in *Geography*, a town of South America, in the province of Quito; 100 miles E.S.E. of Macas.

PINCHINA, one of the Cordilleras, in South America.

PINCHING, in *Gardening*, a sort of pruning, performed by nipping or breaking off the branches or springs of a plant, or tree, between the nails of two fingers.

Most gardeners hold, that pinching contributes to the abundance of the fruit, as well as of the branches; and they say that young shoots, thus lopped, are less apt to grow black and die, than when cut with a pruning-knife.

The season for pinching is chiefly in April or May; sometimes it is also practised in June and July. The fruits it is practised on, are chiefly melons, cucumbers, &c. Quintiny also prescribes it for fruit-trees.

It is chiefly to be practised on the large branches towards the top of the plant, or tree, which are useless, and yet consume a great quantity of good sap. It must rarely be employed on the large branches below; which ought always to be preserved for the winter's pruning, that they may yield others the following year, fit to fill the empty places. Nor must the operation of pinching be performed on the tender shoots; because, having only just sap enough for themselves, when they come to put forth more branches in the place where they are pinched, the small stock of sap allotted them, being divided, will starve them. The operation is to be performed within two or three eyes of the branch they grow out of.

The effect of pinching is, that instead of one useless, and, perhaps, hurtful wood-branch, a vigorous tree will put forth two or three at the eyes remaining; and the sap being thus divided, the branches will be less, and fit for both wood and fruit.

PINCHING, in the *Manege*, is when, the horse standing, the rider holds him fast with the bridle-hand, and applies the spurs just to the hairs of his sides, without pricking him.

If the horse is impatient under this, and draws himself up, and wants to go forward, it is a sign of vigour and mettle. But the purchaser ought to try the thing himself on the horse's back; for the jockies have the art of making the dullest horse seem to have mettle in these trials. The purchaser must also distinguish between the restlessness of the horse under this treatment that arises from vigour, and that which arises from the horse's being ticklish, and which goes off immediately.

Pinching is accounted an aid, spurring a chastisement or correction.

PINCHUGA, in *Geography*, a town of Russia, in the government of Tobolsk. N. lat. 58° 20'. E. long. 96° 54'.

PINCKNEY, an island on the coast of South Carolina.

—Also, a district, formerly of the upper country of South Carolina, now divided into the districts of York, Chester, Union, and Spartanburgh.

PINCKNEYA, in *Botany*, so named by Michaux, (we are not responsible for the orthography,) in honour of one of his friends or patrons in America, probably Mr. Pinkney, once envoy to the British court; but nothing is recorded on the subject, either in the Flora of Michaux, or in the account of his life, where this tree is mentioned, (see Sims and Konig's *Ann. of Bot.* v. 1. 333,) as used by the inhabitants of Georgia to cure fevers, being allied to the *Cinchona*, or Peruvian bark. Michaux *Boreal-Amer.* v. 1. 103. *Ait. Hort. Kew.* v. 1. 372. Class and order, *Pentandria Monogynia*. Nat. Ord. *Rubiaceae*, Juss.

Gen. Ch. *Cal.* Perianth superior, in five deep acute segments, one (rarely two) of which is dilated into a large coloured leaf, deciduous. *Cor.* of one petal, funnel-shaped; tube thrice as long as the ordinary segments of the calyx, five-sided; limb in five deep, revolute, obtuse, nearly equal segments, half the length of the tube. *Stam.* Filaments five, awl-shaped, equal, inserted into the tube near its base, shorter than the limb; anthers oblong, incumbent. *Pist.* Germen inferior, roundish-oblong; style the length and form of the stamens; stigma thickish, in two obtuse lobes. *Peric.* Capsule globose, slightly compressed, with a furrow at each side, cartilaginous, thin, coated, of two cells and two valves, the partitions from the centre of each valve. *Seeds* numerous, horizontal, oval, depressed, with a membranous orbicular wing. *Receptacle* central, angular.

Eff. Ch. One segment of the calyx very large, leafy. Corolla funnel-shaped, five-cleft. Stamens prominent. Stigma bluntly two-lobed. Capsule inferior, of two cells and two valves. Seeds numerous, winged.

1. *P. pubens*. Downy Pinckneya. Mich. *ibid.* 105. t. 13.—Native of the banks of the river St. Mary in Georgia. Brought into England by the late Mr. John Frazer in 1786. It is a greenhouse plant, flowering in June and July. We are obliged to Mr. Frazer for fine specimens in flower and seed. Others are found in the herbarium of the younger Linnaeus, which must have been collected before Michaux visited America, and we suspect they were sent by Bartram. This is a very handsome *shrub*, or small *tree*, with opposite downy *branches*. *Leaves* opposite, on downy stalks, oval, acute at each end, entire, a span long; naked, but roughish above; paler and rather downy beneath. *Stipules* between the footstalks, small, acute, deciduous. *Panicles* terminal, corymbose, many-flowered, downy, as well as the *calyx*, and outside of the *corolla*. *Flowers* an inch long, pale, streaked with purple. Their most conspicuous part is the large, oval, whitish, downy, leafy expansion, which takes the place of one segment of the *calyx*, as in the first and second species of *MUSSENDA*; see that article. The *capsule* is as big as a large gooseberry, of a rigid, cartilaginous, but thin texture, with a deciduous skin. This genus is intermediate between *Cinchona* and *Mussenda*, but seems sufficiently distinct in its fruit from the former; as it unquestionably is from the latter, with which the habit most agrees. The name of *Bartramia* was defined for it, the original *Bartramia* being a *Triumfetta*; but there is now a very fine and distinct genus of mosses established under this appellation. See *MUSCI*.

PINCKNEYVILLE, in *Geography*, a post-town of South Carolina, and capital of Union district, on the S.W. side of Broad river, at the mouth of Pacolet, containing a handsome work-house, a gaol, and a few compact houses; 75 miles N.W. of Columbia.

PINCOS,

PINCOS, a town of Peru, in the diocese of Lima; 15 miles S. of Xauxa.

PINCZESTI, a town of European Turkey, in Moldavia; 28 miles S.W. of Jassy.

PINDA, a sea-port town of Africa, in the kingdom of Congo, on the left side of the Zaire; 125 miles W.S.W. of St. Salvador.—Also, a river of Africa, which runs into the Indian sea, S. lat. 13° 28'.

PINDALA, a town of Hindoostan, in Tellingana; 15 miles S. of Warengole.

PINDAMAHA, a town of Brazil, in the government of St. Paul; 80 miles N.N.E. of St. Paul.

PINDAR, in *Biography*, the most famous lyric poet of ancient Greece, was a native of Cynoscephalæ, near Thebes in Bœotia. The time of his birth is uncertain, but it is well known that he was at the height of his reputation at the time of the expedition of Xerxes, or B.C. 480. Although brought up under excellent instructors, he was chiefly indebted to his own exertions and genius for his peculiar excellencies. His chief patrons were Theron of Agrigentum and Hiero of Syracuse, whom he has commemorated in his poems. He celebrated the city of Athens in such lofty terms, as greatly to excite the displeasure of his countrymen the Thebans, who, on that account, imposed a fine upon him, which the Athenians not only doubly repaid, but erected a statue to his honour. His reputation was so great, that we find he was rewarded in the public assemblies of Greece with the prize, in preference to every other competitor; and as the conquerors at Olympia were the subjects of his compositions, the poet was courted by statesmen and princes. His hymns and pæans were repeated before the most crowded assemblies in the temples of Greece; and the priests of Delphi declared that it was the will of Apollo that her chief poet should receive half of all the first-fruit offerings that were annually heaped on his altars. This was not the only public honour which he received; after his death he was honoured with every mark of respect, even to adoration. His statue was erected at Thebes in the public place where the games were exhibited, and, six centuries after, it was viewed with the utmost sensations of pleasure and admiration by the geographer Pausanias. The honours which were paid him while alive were also shared by his posterity, and as a mark of their high attention and reverence, at the celebration of one of the festivals of the Greeks, a portion of the victim which had been offered in sacrifice was reserved for the descendants of the poet. Even the most inveterate enemies of the Thebans shewed a regard for his memory, and the Spartans spared the house which the prince of the Lyriæ had inhabited, when they destroyed the houses and the walls of Thebes. The same sort of respect was likewise paid him by Alexander the Great, when Thebes was reduced to ashes. He died in the public theatre at an advanced age, about the year 440 B.C. The greatest part of his works has perished. He had composed some hymns to the gods, poems in honour of Apollo, dithyrambs to Bacchus, and odes on several victories obtained at the four greatest festivals of the Greeks, the Olympic, Isthmian, Pythian, and Nemean games. Of all these the odes are the only compositions extant, admired for sublimity of sentiments, grandeur of expression, energy and magnificence of style, boldness of metaphors, harmony of numbers, and elegance of diction. In these odes, which were repeated with the aid of musical instruments, and accompanied by the various inflections of the voice, with suitable attitudes, and proper motions of the body, the poet has not merely celebrated the place where the victory was won, but has introduced beautiful episodes, and by unfold-

ing the greatness of his heroes, the dignity of their characters, and the glory of the several republics where they flourished, he has rendered the whole highly beautiful, and in the greatest degree interesting. Horace has called our poet inimitable, and this panegyric will not, perhaps, appear too strong, since succeeding critics have agreed in extolling his beauties, his excellence, the fire, the animation and enthusiasm of his genius. Horace refers likewise to his pathetic and moral commemorations of departed excellence. It was probably in strains of this kind by which he acquired the epithets of *wise* and *divine* from Plato. Dionysius of Halicarnassus speaks of Pindar as the chief model among the lyric poets of what he denominates "severe and antique harmony," and he also extols his loftiness, energy, fertility, art, and strength of diction mixed with sweetness. Quintilian repeats these praises, but Longinus represents him as sometimes, when glowing with the brightest flame, undergoing a sudden extinction; and a more modern critic seems to join issue with the author of the "Sublime:" speaking of his odes, he says they have indeed those characteristics of fire, rapidity, and variety, for which he is so much celebrated by the critics of antiquity, but that fire is frequently obscured in smoke, and that variety is produced by digressions so excurive, that it is often scarcely possible to follow him, and trace their relation to his proposed subject." The best editions of this poet are those of Heyne, Gr. et Lat. Gotting. 1773, 1798; the latter, which is in octavo, contains the Greek scholia. Moreri. Bibliogr. Dict.

PINDARIC, in *Poetry*, an ode formed in imitation of the manner of Pindar.

The Pindaric manner is distinguished by the boldness and height of the flights, the suddenness and surprisings of the transitions, and the seeming irregularity, wildness, and enthusiasm, of the whole.

Pindar, whence the manner takes its name, was of Thebes; he flourished about four hundred and sixty-eight years before Christ, and was contemporary with Æschylus. What we have remaining of his is a book of odes, all in praise of the victors at the Olympian, Pythian, Nemean, and Isthmian games; whence the first is entitled, the *Olympians*; the second, the *Pythians*; the third, the *Nemeans*; and the fourth, the *Isthmians*. Pindar is full of force and fire; his thoughts are sententious, his style impetuous, his sallies daring, and frequently running, as it were, at random; he affects a beautiful disorder, which, yet, is said to be the effect of the greatest art. See the preceding article.

As the subject which engaged his attention comprehended the praises of those who had gained the prize in the public games, it was necessarily very barren; and therefore he is perpetually digressive, and fills up his poems with fables of the gods and heroes, that have little connection either with his subject or with one another. Many of the histories of particular families and cities, to which he alludes, are now unknown to us, and therefore, though the ancients admired him greatly, he is often so obscure to modern readers, partly from his subjects, and partly from his rapid abrupt manner of treating them, that, notwithstanding the beauty of his expression, our pleasure in reading him is very much diminished.

The supposed irregularity of his numbers has made several of his imitators imagine themselves Pindaric poets, by the mere wildness and irregularity of their verses. None of our writers seem to have succeeded in the Pindaric character better than Cowley.

In a Pindaric ode, the plan of the whole ought to be drawn first, and the places marked out where the elegant sallies

fallies and wanderings may best be, and how the returns may be justly made to the subject. See ODE.

**PINDING**, a disease among lambs which are in the state of suckling. These animals, before they begin to eat grass, are liable to have a discharge from the bowels of a tough, glutinous, adhesive quality, which is apt to stick to the tail and buttocks, and when hardened by the sun, sometimes to glue them together in so close and firm a manner, as to prevent all possibility of their having any evacuations, and thereby soon to mortify and burst the intestines. The complaint is discovered in an easy manner, by the lambs appearing swelled and sick, with the upper and middle parts of their tails closely glued down, and they are as readily cured, by separating their tails from their buttocks, when the retained excrement will be discharged with a disagreeable smell. And the immediate recurrence of it will be prevented by rubbing the parts over with sand, friable clay, mud, or, what is better, a little tallow. But they must be well looked after for eight or ten days, until they begin to eat grass, when all danger from these obstructions is over. It is said to be most dangerous when the ewes are in high condition, and the season dry and backward; and seldom or ever to appear when the mothers are lean, and the weather disposed to be wet.

**PINDLOCK**, in *Geography*, a town of Germany, in the principality of Culmbach; three miles N.N.E. of Bayreuth.

**PINDMISSUS**, in *Ancient Geography*, a town of Asia, in Syria, situated on the mountains, near the small river Singas, on the W. side of the Euphrates, S.W. of Samofata.—Also, a town of Cilicia, near mount Amanus, belonging to the Eleuthero-Cilicians, according to Cicero, ad Attic. l. v.

**PINDUS**, a chain of mountains of Thessaly, extending to the S.W., consecrated to the Muses. This chain extended also towards Epirus, and was inhabited by the Athamanes, the Æthices, and the Perrhæbians.—Also, a town of Greece, in the Doride, placed by Strabo on the banks of a river of the same name, which discharged itself into the Cephissus. It is also called "Ciphus" by some authors. It was within the territory of this town that the Hellenes, driven from the Histiotide by the Cadmæans, went to establish themselves, according to Herodotus.

**PINE**, in *Botany*, &c. See BROMELIA and PINUS.

**PINE**, in the *Materia Medica* and *Rural Economy*. Although most species of fir possess in common the same medicinal properties, and all agree in affording the different products of the turpentine kind, yet some species produce these different articles in greater purity, and in more abundance, than others. From the wild pine, *Pinus sylvestris*, pinaster, or Scotch fir-tree, is obtained most plentifully the *pix liquida*, or tar, and from it may also be procured the common turpentine, and the white and yellow resins. The manner in which the tar is procured is by cutting the tree into pieces, and then enclosing them in a large oven constructed for the purpose, with a channel at the bottom. A sufficient degree of heat is then applied, by which the tar is forced out of the wood, and it runs off by the opening at the bottom: a process which is denominated "*distillatio per descensum*."

Upon an incision being made into the bark of the *Pinus abies*, or Norway spruce fir-tree, a clear tenacious fluid issues, which concretes into a resinous substance, known by the name of "*resina abietis*." This, after being boiled in water, and strained through a linen cloth, is called in the Pharmacopœias "*pix Burgundica*," or Burgundy pitch. But if the boiling of the native resin is continued till the water is

wholly evaporated, and wine vinegar is at this time added, a substance is formed, called "*colophonium*;" which see. See also *Burgundy Pitch*.

Linnaeus, and several other writers in the *Materia Medica*, refer the common turpentine to the "*pinus sylvestris*;" and the "*Terebinthina argentoratensis*," or Straßburgh turpentine, to the "*Pinus picea*," or silver fir-tree; yet upon the authority of Murray, who follows Du Hamel and Haller, Dr. Woodville ascribes the "*Terebinthina vulgaris*" to the latter pine, which pours out the turpentine so freely, that it is seldom necessary to make incisions through the bark for the purpose.

The "*Terebinthina Veneta*," or "*larigna*," as it may be more properly called, (because we are not wholly supplied with this article by the Venetians,) issues spontaneously through the bark of this tree, but is more commonly obtained by wounding the bark at the distance of about two feet from the ground, and inserting in the wood a small cannula, through which the turpentine flows into proper vessels, which are placed for its reception.

We may here observe farther, and more generally, that pitch, tar, resin, and turpentine, are all made from these trees by a very familiar process. In the spring time, when the sap is most free in running, they pare off the bark of the pine-tree, to make the sap run down into a hole, which they cut at the bottom to receive it; in the way, as it runs down, it leaves a white matter like cream, but a little thicker; this is very different from all the kinds of resin and turpentine in use, and it is generally sold to be used in the making of flambeaux, instead of white bees-wax. The matter that is received in the hole at the bottom is taken up with ladles, and put into a large basket; a great part of this immediately runs through, and this is the common turpentine. This is received into stone or earthen pots, and is ready for sale. The thicker matter, which remains in the basket, they put into a common alembic, and adding a large quantity of water, they distil this so long as any oil is seen swimming upon the water; this oil they separate from the surface in large quantities, and this is the common oil or spirit of turpentine: the remaining matter at the bottom of the still is common yellow resin. When they have thus obtained all that they can from the sap of the tree, they cut it down, and hewing the wood into billets, they fill a pit dug in the earth with these billets; and setting them on fire, there runs from them, while they are burning, a black thick matter; this naturally falls to the bottom of the pit, and this is the tar. The top of the pit is covered with tiles, to keep in the heat; and there is at the bottom a little hole, out of which the tar runs like oil; if this hole be made too large, it sets the whole quantity of the tar on fire; but if small enough, it runs quietly out.

The tar, being thus made, is put into barrels; and if it be to be made into pitch, they put it into large boiling vessels, without adding any thing to it; it is then suffered to boil a while, and being then let out, is found, when cold, to be what we call pitch. Phil. Trans. N° 243. p. 291.

In a medical point of view it may be remarked, that the kernels of the nuts of the manured or stone pine, are of a balsamic and nourishing nature; good for consumptions, coughs, and hoarsenesses, restorative, and of service after long illnesses.

The leaves and tender tops of pines and fir are used for diet-drinks, and allowed to be antiscorbutic and diuretic. See *CHOWDER-beer*.

The resinous exudations of pines or firs are an important branch in the *materia medica*, and not only useful in the prescriptions of physicians, but have also been thought otherwise

wife conducive to health. Pliny tells us, that wines, in the time of the old Romans, were medicated with pitch and resin. And Jonstonus, in his *Dendrographia*, observes, that it is wholesome to walk in groves of pine-trees, which impregnate the air with balsamic particles. It is known that all turpentine and resins are good for the lungs, against gravel, also, and obstructions; and it is said, that the medicinal properties of those drugs are found in tar-water, which operates without heating the blood, or disordering the stomach. See PITCH, RESIN, TAR, and TURPENTINE.

PINE-Apple, in *Botany, Gardening, &c.* See BROMELIA.

PINE, Ground, a species of germander.

PINE, Heath, Low. See CORIS.

PINE, Screw. See PANDANUS.

PINE, Stinking ground. See CAMPHOROSMA.

PINE-Tree, in *Planting*, the name of a forest tree, of which there are several kinds that deserve cultivating; namely, the Scotch pine, which is so called from its growing naturally on the mountains in Scotland, and which is the tree that affords the red or yellow deal, which is the most durable of any of the kinds yet known. The leaves of this tree are pretty broad and short, of a greyish colour, growing two out of each sheath; the cones are small, pyramidal, and end in narrow points; they are of a light colour, and the seeds are small: this sort grows well upon almost every soil; they have been planted in great numbers upon peat-bogs, where they have made great progress; also in clay soils, where they have succeeded far beyond expectation; and upon sand, gravel, and chalk, they likewise thrive well; but as they do not grow near so fast upon gravel and sand as upon moist ground, so the wood is much preferable; for those trees which have been cut down upon moist soils, where they have made the greatest progress, when they have been sawn out into boards have not been valuable; the wood has been white, and of a loose texture; whereas, those which have been grown upon dry gravelly ground, have proved nearly equal to the best foreign deals. Those plantations, which have been made of late years of these trees, will in the next age, not only turn greatly to the advantage of their possessors, but also become a national benefit.

Another variety of this sort of tree is called *pineaster*, which is a large timber tree, and naturally throws out very large arms, some of which will be nearly horizontal. Some people think these trees very ornamental on this account; for, in the winter especially, they appear naked, and are of a yellowish colour; and being spread abroad thus large, and without order, in the mixture of the more regular sorts of growing firs, they make a good contrast. It must be observed, that the leaves of this sort are very large and long, and of a lighter green, than those of the Scotch fir, which is another circumstance to direct to its situation; and it must also be observed, that those long and large leaves which ornament the younger branches only, give the tree a majestic air; and as the larger arms appear naked to view, so the younger, being thus plentifully furnished, have a noble effect, besides what beauty it receives from its numerous cones. And Mr. Nicol remarks, that the timber of the Scotch pine or fir is found in highest perfection on the bleak and gravelly seats. In light sand, it is also found durable. But in the richer more loamy soils, although it grows apace while young, and flourishes exuberantly, it soon sickens, is short-lived; nor is the wood valuable, but short and brittle. On retentive, tilly clays, in which it is often planted, but from which, above all others, it should be excluded, it frequently becomes stunted about the twentieth or thirtieth year of its age; or when the roots have exhausted the upper soil, and begin to seek pasturage in the sub-soil, inasmuch, that the

worms attack it on its limbs, anticipating, as it were, its dissolution.

And the white, or Weymouth pine, is one of the tallest trees of all the species, often growing a hundred feet high. The bark of this tree is very smooth and delicate, especially when young; the leaves are long and slender, five growing out of each sheath; the branches are pretty close, garnished with them, so make a fine appearance; the cones are long, slender, and very loose, opening with the first warmth of the spring: so that if they are not gathered in winter, the scales open and let out the seeds. The wood of this sort is esteemed for making of masts for ships. As the wood of this tree was generally thought of great service to the navy, there was a law made in the ninth year of queen Anne, for the preservation of the trees, and to encourage their growth in America: and it is only within these forty years past that these trees have begun to be propagated in England in any plenty, though there were some large trees of this sort growing in two or three places long before, particularly at the marquis of Bath's at Longleet; and sir Wyndham Knatchbull's in Kent; and it hath been chiefly from the seeds of the latter that the much greater number of these trees now in England have been raised; for although there have annually been some of the seeds brought from America, yet those have been few in comparison to the produce of the trees in Kent: many of the trees which have been raised from the seeds of those trees, now produce plenty of the seeds, particularly those in the garden of the late duke of Argyle at Whitton, which annually produce large quantities of cones.

According to Hanbury, the soil which this tree delights in most is a sandy loam; but it likes other soils of an inferior nature; and although it is not generally to be planted on all lands, like the Scotch fir, yet he has seen it luxuriant and healthy, making strong shoots, on blue and red clays, and other sorts of ground; on strong and stony ground, likewise, he has seen some very fine trees: so that, he believes, whoever is desirous of having plantations of this pine, need not be curious in the choice of his ground.

And this sort of pine will grow, Mr. Nicol says, in many different soils and situations, but seems to affect most a deep sandy loam. On chalky, gravelly, elevated grounds, it is found to luxuriate. It will also thrive in pretty strong clay, if lying on an open sub-stratum. It is impatient of stagnant water, nor will it flourish on a till. It is an elegant tree, and worthy of a place in all extensive plantations. He considers the timber as much superior in quality when produced on mountains, to that produced on richer soils, and in more sheltered situations. In fine, as already said, except on sandy or gravelly soils, this tree ought not to be planted. The many observations he has made in the Highlands confirm him in this opinion. The value of fir-timber (and that reared in the northern parts of the island, in soil and situation as above, is inferior to none) is known to every mechanic; nor is there any one at all acquainted with the arts, who does not know, that from this tree is extracted rosin, tar, &c.: articles which are so useful for many, especially naval purposes.

And the deciduous pine or larch is a lofty tree: its branches are slender, and incline downward: the leaves are of a light green; and like those of the cedar, are bunched together in a similar manner to the pencils or little brushes of the painter. In spring, when the leaves and flowers are breaking out, it has a particularly elegant appearance; and in the winter, it gives variety to a wooded scene by the bright colours of its naked branches: it is in good esteem as an ornamental tree, and its timber is of the more useful kind,

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being superior to that of most of the pine tribe. Indeed the utility of its wood has been highly extolled by ancient writers, and there can be no doubt but that it is an excellent wood for ship and house building. At Venice its wood is frequently used in building their houses, as well as in Switzerland, where those trees abound: so that, without doubt, the larch excels for masts for ships, or beams for houses, doors, windows, &c. particularly as it is said to resist the worm. It is remarked, that in Switzerland their houses are covered with boards of this wood, cut out a foot square; and as it emits a resinous substance, it so diffuses itself into every joint and crevice, and becomes so compact and close, as well as so hardened by the air, as to render the covering proof against all weather. But as such coverings for houses would cause great devastation in case of fire, the buildings are confined to a limited distance by an order of police from the magistrates. The wood, when first laid on the houses, is said to be very white; but this colour, in two or three years, is changed, by means of the sun and resin, to a black, which appears like a smooth shining varnish.

In his work on planting, Mr. Marshall has observed, that of the common larch there are several varieties. And that the flowers which the commonest sort exhibits early in the spring are of a delicate red colour; another sort produces white flowers at the same season, and these have a delightful effect among those of the red sort; whilst another, called the black Newfoundland larch, increases the variety, though by an aspect little differing from the others. There are also larches with greenish flowers, pale-red, &c. all of which are accidental varieties from seeds. These varieties are easily distinguished, even when out of blow: the young shoots of the white flowering larch are of the lightest green, and the cones when ripe are nearly white. The red-flowering larch has its shoots of a reddish cast, and the cones are of a brown colour; whilst the cones and shoots of the black Newfoundland larch are in the same manner proportionably tinged. The cones, which are a very great ornament to several sorts of the pines, are very little to these. Their chief beauty consists in the manner of their growth, the nature and beauty of their pencilled leaves, and fair flowers; for the cones that succeed them are small, of a whitish, a reddish, or a blackish-brown colour, and make no figure.

It is stated by the same writer, that the larch tree will grow extremely well on almost any soil, as well in clays as in other sorts; it thrives amazingly on the declivities of hills, and sides of high mountains; it is hardy enough to resist the severest cold, therefore proper for all exposed places: and, as the timber is so valuable, and its growth so quick, it is a tree which may be propagated to the great advantage of the owner. In fact, it is almost impossible to say too much in favour of this tree. It grows on the barrenest soils, and in the bleakest situations. In rich genial scites it luxuriates too much, grows top-heavy, and either loses its head, or is bowed down into an unsightly form, and becomes unprofitable. Its timber, whether in the water, or in contact with the earth, is durable almost beyond comparison.

In his Treatise on Planting, Mr. Nicol, however, observes that, which soil, in this country, when in a state of full maturity, this noble tree may most affect, remains yet to be known. If we may judge from appearances, we shall decide, that it will be found in the highest perfection of timber in the lighter more gravelly soils, and in elevated situations. That it luxuriates beyond every other tree, in all soils and situations, excepting those of a low, humid kind, is demonstrated in every instance where impartial comparison is made.

And it is observed by Marshall, that the Norway spruce

is a tree of as much beauty while growing, as its timber is valuable when propagated on that account. Its growth is naturally like the silver fir upright; and the height it will aspire to may easily be conceived, when we say that the white deal, so much coveted by the joiners, &c. is the wood of this tree; and it may perhaps satisfy the curious reader to know that from this fir pitch is drawn. The leaves are of a dark green colour; they stand singly on the branches, but the younger shoots are very closely garnished with them. They are very narrow, their ends are pointed, and they are possessed of such beauties as to excite admiration. The cones are eight or ten inches long, and hung downwards.

The better the soil is, the faster will the spruce fir grow, though it will thrive very well in most of our English lands. In strong loamy earth it makes a surprising progress; and it delights in fresh lands of all sorts, which never has been worn out by ploughing, &c. though it be ever so poor.

But why this tree has obtained the name of Norway, rather than Swedish or Danish spruce, is a question Mr. Nicol thinks of little importance. Certain it is, however, that many have been led to mistake on this account, supposing it to be the tree which produces the deal known by the name of Norway fir, and which is the produce of the Scotch fir beyond all doubt. The timber known by the name of Memel log is the produce of the spruce. It will, he adds, like all the fir tribes, grow in very different soils; but it is found in greatest luxuriance in deep sandy loams, where it hath freedom of space. On clays which are not retentive of water below, although moist of themselves, it will make surprising progress. On thin soils, and in bleak situations, it grows slowly; and may therefore become the better timber of any, on such: but here it becomes unsightly.

It cannot be cultivated in this country with such advantage as the Scotch fir, in respect of timber; but as an ornamental tree it outdoes it, where the soil is favourable. There are some majestic spruce firs at Duplin, the seat of lord Kinnoul, which are supposed the largest in the kingdom. From this tree pitch is also extracted in great abundance.

The American spruce fir, Mr. Marshall thinks, includes three varieties: the white Newfoundland spruce; the red Newfoundland spruce; and the black Newfoundland spruce; they however differ so little, that one description is common to them all. They are of a genteel upright growth, though they do not shoot so freely or grow so fast with us as the Norway spruce. The leaves are of the same green, and garnish the branches in the same beautiful manner as those of that species, only they are narrower, shorter, and stand closer. The greatest difference is observable in the cones; for these are no more than about an inch in length, and the scales are closely placed. In the cones, indeed, consists the difference of these three sorts: those of the white species are of a very light brown colour; those of the red species more of a nut brown or reddish colour; and those of the black species of a dark or blackish colour. Besides this, there is scarcely any material difference; though it is observable, that this trifling variation seems to be pretty constant in the plants raised from the like seeds. These sorts will often flower and produce cones when only about five or six feet high; and indeed look then very beautiful: but this is a sign of weakness in the plant, which it does not often fairly overcome. And it is added, that in many parts of England this is a very difficult tree to raise. It spends itself in cones, and becomes stunted and unsightly. Nevertheless, in the vallies of the Highlands, it thrives with full luxuriance and vigour; forming a rich picturable outline, possessing more strength of feature than most of the pines. As

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a standard in polished scenery, there are few trees that equal it; as may be seen at Enville and Fisherwick.

But Mr. Nicol thinks that these trees seem to affect most a deep black loam of a middling texture, and which is also sub-humid of itself, but does not retain stagnant water. They will also thrive well on sandy or gravelly loams of a moist nature. On dry shallow soils they languish; nor will they thrive on very exposed sites. In deep, sub-humid valleys, are to be found those most flatly in this country. They require full space; otherwise they become very un-ightly, even in youth. This tree, in America, arrives to great magnitude, and produces that vast store of masts and spars exported thence to Europe. Of this tree they also construct many ships of great burthen. But, in this country, the larch far excels it in any situation, and, as timber, is more valuable for this and all other purposes.

It becomes a fine ornamental detached tree on good soil, if allowed room to branch in its youth, and while nursing; but at the same time it requires shelter.

There are two varieties of the yellow-leaved fir, of which the silver fir is a noble, upright, full-growing tree. The branches are not very numerous, and the bark is smooth and delicate. The leaves grow singly on the branches, and their ends are slightly indented. Their upper surface is of a fine strong green colour, and their under has an ornament of two white lines, running lengthways on each side the midrib, on account of which silvery look this sort is called the silver fir. The cones are large, and grow erect; and when the warm weather comes on, they soon shed their seeds; which should be a caution to all who wish to raise this plant, to gather the cones before that happens.

The other variety is the balm of Gilead fir, which has of all the sorts been most coveted, on account of the great fragrance of its leaves: though this is not its only good property; for it is a very beautiful tree, naturally of an upright growth, and the branches are so ornamented with their balmy leaves, as to exceed any of the other sorts in beauty. The leaves, which are very closely set on the branches, are broad, and their ends are indented. Their upper surface, when healthy, is of a fine dark green colour, and their under has white lines on each side the midrib lengthways, nearly like those of the silver fir. These leaves, when bruised, are very finely scented; and the buds, which swell in the autumn for the next year's shoot, are very ornamental all winter, being turgid, and of a fine brown colour; and from these also exudes a kind of fine turpentine, of the same kind of (though heightened) fragrance.

The silver fir is exceedingly hardy, and will grow in any soil or situation, but always makes the greatest progress in a good rich loamy earth.

Mr. Nicol remarks, that the silver fir grows most luxuriantly in deep loamy earth; but there its wood is soft and spongy. It will thrive on bleak exposures, and thin gravelly or sandy soil. But that in which we may expect its timber in highest perfection, is a sandy loam, lying on a gravelly subsoil, or dry rock. On the mountains of Switzerland it is said to grow to a vast size, is excellent timber, and is used for many valuable purposes. In particular, turpentine is extracted from it; and it would seem that from this tree is extracted the true Venice turpentine; although there is an inferior kind extracted from the larch, which also passes under that name. As an ornamental tree, it is admissible in all extensive designs, and even on a smaller scale where variety is studied.

The latter sort must be planted in a deep, rich, good earth; neither will it live long in any other sort of soil. It matters little whether it be a black mould, or of a sandy

nature, provided it be deep, and there is room for the roots to strike freely. See PINUS.

In the raising of the trees, all the sorts are propagated by seeds, which are produced in their hard woody cones: the way to get the seeds out of these cones, which are close, is to lay them in the sun or before a gentle fire, which causes the cells to open, and then the seeds may be easily taken out. If the cones are kept entire, the seeds will remain good some years, so that the surest way to preserve them, is to let them remain in the cones until the time of sowing: if the cones are kept in a warm place in summer, they will open and emit the seeds; but if they are not exposed too much to heat, many of the sorts will remain entire some years, especially those which are close and compact; and the seeds, which have been taken out of cones after seven years, have grown very well, so that these may be transported to any distance, provided the cones are well ripened and properly put up.

The best time for sowing the seeds is about the end of March; when they are sown, the place should be covered with nets to keep off birds: otherwise, when the plants begin to appear with the husk of the seed on their tops, the birds will pick off the heads of the plants, and destroy them. Where the quantity of seed to be sown is large, so as to require a good space to receive them, they should be sown on an east or north-east bed of fine mould in the nursery, where they may be screened from the sun, whose heat is very injurious to the plants at their first appearance above ground. When the plants appear, they must be constantly kept clean from weeds; and in very dry seasons, if they are now and then gently refreshed with water, it will forward their growth; but this must be done with great care and caution, for if they are hastily watered it may wash the tender plants out of the ground, or lay them down flat, which often rots their stalks; and when this is too often repeated, it will have the same effect; so that unless it is judiciously performed, it will be the best way to give them none, but only screen them from the sun and wind.

In cases where the plants come up too close, it will be a good method to thin them gently about the beginning of July. The plants, which are drawn up may be planted on other beds, which should be prepared ready to receive them, as they should be immediately planted as they are drawn up, because their tender roots are soon dried and spoiled at this season of the year. This work should be done, if possible, in cloudy or rainy weather, and then the plants will draw out with better roots, and will soon put out new fibres again; but if the weather should be dry, the plants should be shaded every day from the sun with mats, and now and then gently refreshed with water. In drawing up the plants, there should be great care taken not to disturb the roots of those that are left remaining in the seed-beds, &c. so that if the ground be hard, the beds should be well watered some time before the plants are thinned, to soften and loosen the earth; and if, after they are drawn out, the beds are again gently watered to settle the earth to the roots of the remaining plants, it will be of great service to them; but it must be done with great care, so as not to wash out their roots, or lay down the plants. The distance which should be allowed these plants, is four or five inches row from row, and three inches in the rows, but some allow them more.

And in these beds the plants may remain till the spring twelve-months after, by which time they will be fit to plant out where they are to remain, as the younger the plants are, when planted out, the better they succeed; for though some sorts will bear removing at a much greater age, young plants

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plants put out at the same time will in a few years overtake the large ones, and soon outstrip them in their growth; and there is an advantage in planting them by saving the expence of staking and much watering which large plants require. It is often the case, with respect to plantations of pines, which were made of plants six or seven feet high, and at the same time others of one foot high planted between them, that in ten years the latter are better trees than the former, and much more vigorous in their growth; but if the ground, where they are designed to remain, cannot be prepared in proper time, the plants should be removed out of the seed-beds into a nursery, where they remain two years, but they should not continue much longer on any account.

The best season for planting out pine-trees, is the early spring, as March or the following month, just before they begin to shoot; for although the Scotch and some of the most hardy sorts may be removed in the autumn or winter, especially when they are growing in strong land, where they can be taken up with balls of earth to their roots; it is not a practice to be generally adopted in other cases.

In instances where these trees are planted in exposed situations, they should be put pretty close together, especially on the out-sides, that they may shelter each other; and when they have grown a few years, part of the plants may be thinned out, to give room for the others to grow. But this must be gradually performed, lest by too much opening the plantation at once, the air should be let in among the remaining trees with too great violence, and stop their growth.

And wherever large plantations of these trees are designed to be made, the best method will be to raise the plants either upon a part of the same land, or as near to the place as possible, and also upon the same sort of soil. A small piece of ground will be sufficient to raise plants enough for many acres. As the Scotch and larch kinds are capable of thriving upon the most barren sands, where scarcely any thing else except heath and furze will grow, they may in many situations be extensively planted; as there are many thousand acres of such land, which at present are of little benefit to any body, that might, by plantations of these trees, become of great value to their proprietors, and also a national benefit. It is in general the expence of making such plantations, that chiefly operates against such undertakings; though, when properly managed, it is much less than is commonly supposed, as the greatest of the expence is that of fencing them from the cattle, &c. for the other is trifling, as there will be no necessity of preparing the ground to receive the plants; and the charge of planting an acre of land with these plants will not be more than thirty shillings, where labour is dear, exclusive of the plants, which may be valued at forty shillings more. Many acres of land have been planted with these trees, which were covered with heath and furze, merely by digging holes to put in the plants, and afterwards laying the heath or furze, which was put upon the surface of the ground, about their roots, to prevent the ground drying; few of which have failed; the plants being mostly four years old from the seed. In five or six years, the pines have grown so well as to overpower the heath and furze, and destroy it, without their having had any further culture.

In regard to the distance at which they are generally planted in all large open situations, it is about four feet, but always irregular, avoiding planting in rows as much as possible; and in performing the work, great care is necessary not to take up the plants faster than they can be planted out, some men being employed in digging up the

plants, while others are planting. Those who take up the plants should be looked after, to see that they do not tear off their roots, or wound their bark; and as fast as they are taken up, their roots should be covered, to prevent their drying, and put into their proper situations as soon as possible. In planting them, it is advised that care should be had to make the holes large enough for their roots, as also to loosen and break the clods of earth, and put the finest immediately about their roots, then to settle the earth gently with the foot to the roots of the plants. Where these circumstances are duly attended to, and a proper season chosen for performing it, there will be very little hazard of their succeeding; but where plantations are made with plants which are brought from a great distance, and which have been so closely packed up as to heat, and cause the leaves to become yellow, few of them will grow in a perfect manner.

In general, after the plantations are made, the only care they require, for four, five, or six years, is to secure the plants from cattle, hares, and rabbits; for if these are admitted to them, they make great destruction in a short time: as where the branches are gnawed by hares or rabbits, it greatly retards the growth of the plants, if it does not wholly destroy them. In about this length of time after planting, the branches of the young trees meet, and begin to interfere with each other; therefore they require a proper thinning out. Some, however, advise pruning off the lower branches; but this must be done with great caution. The lower tier of branches only should be cut off: this should be performed in September, at which time there will be no danger of the wounds bleeding too much; and the turpentine will harden over the wounds as the season grows cold, and prevent the wet from penetrating them. These branches should be cut off close to the stems of the plants, and care be taken not to break any of the remaining branches of the young trees. This work should be repeated every other year, at each time taking off only the lower tier of branches: for if the plants are much trimmed, it will greatly retard their growth, as it does in general that of all trees; but as these trees never put out any shoots where they are pruned, so they suffer more from amputation than those which do. It is probably the best practice, in all cases, to thin out the trees so as to let them have sufficient room and air, as they can never be pruned in the branches without great injury. And in about twelve or fourteen years, they will require more thinning, where the plants have made good progress; but this should be gradually performed, beginning in the middle of the plantation first, leaving the outside close, to screen those within from the cold, and by degrees coming to them, when those which were first thinned will have had time to get strength, and not be in danger of suffering from the admission of cold air. When these plantations are thinned, the trees should not be dug up, but their stems cut off close to the ground, as their roots never shoot again, but decay in the earth; so there can be no harm in leaving them, and the roots of the remaining plants are not injured. The trees which are now cut will be fit for many purposes: those which are straight will make good putlocks for the bricklayers, and serve for scaffolding poles; so that there may be as much made by the sale of these as will defray the whole expence of the planting, and probably also interest for the money first laid out for the whole.

And as the upright growth of these trees renders their wood the more valuable, they should be left pretty close together, in order to draw each other up, and grow tall. The naked stems of the trees sometimes rise more than

seventy feet in height, and as straight as possible; and as many boards have been fawn from one of them, as laid the floor of a room near twenty feet square. If these trees are left eight feet asunder each way, it will be sufficient room for their growth: therefore, if, at first thinning, a fourth part of the trees is taken away, the others may stand twelve or fourteen years longer, by which time they will be of a size for making ladders, and standards for scaffolding, and many other purposes; so that from this sale as much may be made, as not only to pay the remaining part of the expence of planting, if any should be wanting in the first, but rent for the land with interest; and the standing trees for fortunes for younger children, or other purposes.

But the great use and value of these sorts of trees will be seen more fully under the proper heads. See *PINE*, *supra*.

*PINE-Tree*, in *Gardening*, the common fir-tree. See *PINUS*.

*PINE-Apple*, in *Metallurgy*, a word used to express a sort of mould, used in the refining of silver. It has this name from its shape, resembling the fruit of that name.

When the refiners have taken the mixture of the silver and mercury together out of the cauldron, and strained it through two coarse wetted cloths, to make it the thicker, they then beat it with a sort of battledores, to drive out yet more of the quicksilver; and straining it again after this, they take out the remaining thick amalgam, and forming it into little pellets, they put these carefully into the moulds called pine-apples, pressing them down. The amalgam, when put into these vessels, or moulds, is usually so rich as to be about one-fifth silver. The manner of divesting this of the quicksilver afterwards is by means of fire; in which the quicksilver rises in vapour, and the silver is left pure behind; but the carelessness of the workmen in doing this, and particularly the using bad vessels, or the not luting them close, causes a waste of this mineral greater than could be conceived. Alonso tells us, that in the city of Potosi alone, at the time of his writing, when the trading in metals ran but low, above thirty thousand pieces of eight were wasted in quicksilver that was lost one year with another. To prevent this, they then principally studied the means of keeping the silver as dry of quicksilver as they could, in the pine-apple; but it then holding four-fifths of the whole mass in quicksilver, the great waste was in the separating it afterwards. See *POTOSI*.

*PINE-Martin*, in *Zoology*. See *MUSTELA Martes*.

*PINE-Salt*, a name given to a preparation of the bark of the pine-tree, used as a sort of seasoning to food in the manner in which we use salt.

The Laplanders are very fond of this; and the manner of their preparing it is given in Scheffer's history of that country. They peel off the bark from the lower part of the bodies of those trees, and separating the outer rough part, they take the inner bark, which they carefully divide into its several thin coats: when they have thus reduced them to as thin pieces as they can, they expose them to the sun in their summer months to dry; and when thoroughly dried, they tear them into thin and narrow slips, and put them up in boxes made of the outer bark of other trees fresh taken off. They bury these boxes in deep holes dug in the sands, and let them remain thus one day; on the day following, they bring together a number of stumps of trees, and other wood, and laying them over the place where the bark is buried, they set them on fire; the next day they take out their buried boxes, and the heat having penetrated so deep into the earth in a mild degree, the bark is found to have been greatly affected by it, and to have received a red co-

lour, and a very agreeable flavour, somewhat sweetish. This is their general sauce: they eat it with all their food, as we do salt; but it has so little of the nature of salt, that the name is ill adapted to it.

There is another vegetable substance, which, though of a disagreeable taste to us, yet custom teaches them to be fond of. This is the angelica petrosa: they cut the large stalks of this plant before it runs to seed, and roast them; they eat this in considerable quantities with their pine-salt, and esteem it not only an agreeable, but a more than ordinary wholesome sort of food.

*PINE*, in *Geography*, a township of America, in Allegany county, Pennsylvania, containing 588 inhabitants.

*PINE-Creek*, a township of America, in Lycoming county, containing 397 inhabitants.

*PINE-Creek*, a river of America, in Pennsylvania, which runs into the west branch of the Susquehanna, N. lat.  $41^{\circ} 11'$ . W. long.  $77^{\circ} 22'$ .

*PINE River*, a river of America, which runs into lake Huron, N. lat.  $45^{\circ} 42'$ . W. long.  $84^{\circ} 25'$ .—Also, a river of America, which runs into the Wabash, N. lat.  $40^{\circ} 15'$ . W. long.  $87^{\circ} 13'$ .—Also, a river of Canada, which runs into lake Huron, N. lat.  $44^{\circ} 44'$ . W. long.  $80^{\circ} 26'$ .

*PINE Island*, a small island in the gulf of Mexico, near the south coast of West Florida. N. lat.  $30^{\circ} 18'$ . W. long.  $88^{\circ} 18'$ .

*PINEA*, in *Botany*. See *PINUS*.

*PINEA*, or *Pigne*, in *Commerce*, a term used in Peru and Chili, for a kind of light, porous masses or lumps, formed of a mixture of mercury and silver-dust from the mines.

The ore, or mineral, of silver, being dug out of the veins of the mine, is first broken, then ground in mills for the purpose, driven by water with iron pestles, each of two hundred pounds weight. The mineral, thus pulverised, is next sifted; then worked up, with water, into a paste; which, when half dry, is cut into pieces, called *cuerpos*, a foot long, weighing each about two thousand five hundred pounds.

Each cuerpo is again kneaded up with sea-salt, which, dissolving, incorporates with it. They then add mercury, from ten to twenty pounds for each cuerpo, kneading the paste afresh until the mercury be incorporated with it. This office being exceedingly dangerous, on account of the noxious qualities of the mercury, is always made the lot of the poor Indians.

This amalgamation is continued for eight or nine days; and some add lime, lead, or tin ore, &c. to forward it; and, in some mines, they are obliged to use fire. To try whether or no the mixture and amalgamation be sufficient, they wash a piece in water; and if the mercury be white, it is a proof that it has had its effect; if black, it must be further worked.

When enough, it is sent to the lavatories, which are large basons that empty successively into one other. The paste, &c. being laid in the uppermost of these, the earth is then washed from it into the rest by a rivulet turned upon it; an Indian, all the while, stirring it with his feet, and two other Indians doing the like in the other basons.

When the water runs quite clear out of the basons, they find the mercury and silver, at bottom, incorporated. This matter they call *pella*, and of this they form the *pineas*, by expressing as much of the mercury as they can; first, by putting it into woollen bags, and pressing and beating it strongly; then, by stamping it in a kind of wooden mould,

of an octagonal form, at the bottom of which is a brass plate pierced full of little holes.

The matter, being taken out of the mould, is laid on a trivet, under which is a large vessel full of water; and the whole being covered with an earthen head, a fire is made around it.

The mercury still remaining in the mass is thus reduced into fumes, and at length condensing, it is precipitated into the water, leaving behind it a mass of silver grains of different figures, which only joining or touching at the extremes, render the matter very porous and light.

This, then, is the pinea, or pigne, which the workmen endeavour to sell secretly to vessels trading to the South sea; and from which those who have ventured to engage in so dangerous a commerce, have made such vast gains. Indeed, the traders herein must be very careful; for the Spanish miners are errant knaves, and to make the pignes weigh the more, they make a practice of filling the middle with sand, or iron.

**PINEAL GLAND**, in *Anatomy*, a small conical body, about the size of a pea, in the brain. See **BRAIN**.

**PINEAU, GABRIEL DU**, in *Biography*, a celebrated French lawyer, was the son of an eminent advocate at Angers, where he was born in 1573. He practised first at his native place, then at Paris, and afterwards was created by Mary de Medicis her master of requests. In her differences with the court, she fought to support herself by his counsels; but, faithful to his sovereign, he continually advised her to an accommodation, which was at length effected. By Lewis XIII. he was nominated mayor and captain-general of Angers in 1632. The integrity and impartiality with which he performed the duties of his station, caused him to be called the father of the people. His house was, at length, made a kind of academy, in which conferences were held on points of law for the instruction of members of the profession, and others. He was exact in the performance of his religious duties, and exemplary in his conduct. He died at the age of 71, in the year 1644. His writings are, "Latin Notes on the Canon Law, in opposition to those of Du Moulin;" "A Latin Commentary on the Custom of Anjou;" "Consultations on several important Questions relative to the Custom of Anjou and to the French Law, with Dissertations on various Subjects:" these were reprinted in 2 vols. folio, 1725. **Moreri**.

**PINEDA, JUAN DE**, a native of Medina del Campo, and author of an universal history under the title of "Le Monarquía Ecclesiastica." He was an indefatigable writer; his commentaries alone filled 6826 leaves in folio. The most useful of his labours, however, was that of editing and abridging a very curious book, entitled "El Pafó Honroso defendido por Suero de Quinones," of which a new edition was printed at Madrid in 1783. Pineda was a Franciscan, and lived to the age of fourscore. There is another writer of the same name, who lived about the same time, a Jesuit, who was of such estimation, that once when he passed through Evero, he was received in the Jesuit college there, and a monument was afterwards erected with this inscription, "Hic Pineda fuit." The task of compiling the great "Index Expurgatorius," published in 1640, was performed by him. He also published a funeral oration for that extraordinary woman Donna Luísa de Carvajal y Mendoza, in the English seminary at Seville.

**PINEDA**, in *Geography*, a town of Spain, on the coast of Catalonia; 12 miles N.E. of Mataro. N. lat.  $41^{\circ} 37'$  E. long.  $2^{\circ} 35'$ .

**PINEG**, a town of Russia, in the government of

Archangel, on the Pinega; 48 miles E. of Archangel. N. lat.  $64^{\circ} 30'$  E. long.  $41^{\circ} 26'$ .

**PINEGA**, a river of Russia, which rises in the province of Usting, and runs into the Dwina; eight miles E. from Cholomgori, in the government of Archangel.

**PINEGROVE**, a township of America, in Berks county, Pennsylvania, containing 1290 inhabitants.

**PINEI nuclei Maluccani five pargatorii**, *J. B. Pinus Indica nucleo purgante C. B. Pinei nuclei Maluccani*. Park., in *Botany*, a species of the croton in the Linnæan system. There grows, says Acofta, in some gardens of Malabar, and also wild, in some woods, a tree of the bigness of a pear-tree, whose leaves are of a watery-green beneath, and of a dead green on the upper face, and are very tender and soft. They are of a very acrid taste, and vellicate the tongue for a long while afterwards: the fruit is triangular, of the size of a filberd, and divided into many capsules, containing each a round sort of white or dark greenish seed, equal to a pine-kernel, when taken out of its shell.

The Indians, as Acofta says, take a couple of the kernels, peel them, and then pound them, and mix them in clysters, against difficulty of urine, and the pain of the sciatica; or exhibit them in cock-broth, for the evacuation of putrid, slimy, grofs, and cold humours, and particularly for the cure of an asthma. They anoint the impetigo with these kernels, bruised in water, and so cure it; but they are very burning. The cathartic pine-kernels, as Monardes says, purge very strongly bile, phlegm, and water; and though milder than filberds, excite vomiting. When roasted, they operate with less violence, and fewer gripes. They are exhibited in chronic diseases, and have a peculiar virtue of evacuating grofs humours.

The fruit of this tree is the grana tiglia of other writers. It is intensely hot and acrimonious; and so violent an evacuant, that it cannot be taken with any tolerable safety. This, as well as the pinhones Indici, and avellana purgatrix, which is a species of the jatropa, in the Linnæan system, yield upon expression a considerable quantity of oil, impregnated more or less with the taste and purgative quality of the seeds; but they all appear too drastic to be ventured on in substance. The wood and leaves of the plants are likewise strong cathartics.

**PINELLI, GIANVINCENZO**, in *Biography*, an eminent patron of literature, was born of Genoese parents, at Naples, in 1535. From a very early period he entered with so much earnestness into literary pursuits, that besides the ancient and several modern languages, there was scarcely any branch of science which he had not acquired. At the age of twenty-three he left Naples for Padua, where he had improved himself by his acquaintance with many eminent scholars. In 1561 he was recommended to Philip II. as the fittest person to undertake a history of Charles V. He is applauded by other learned persons of high estimation on account of his literary and moral qualifications. Though from his rank and situation he might have aspired to the most important stations, yet his fondness for letters, joined to a delicate habit of body, led him to pass his days in retirement. His house was a kind of academy, frequented by the literati, who found in him a munificent patron, and an enlightened director of their studies. He collected a numerous library of books; expensive mathematical and astronomical instruments; a cabinet of fossils and minerals; together with maps, plates, and every thing that could facilitate learned research. He died in 1601, and the fate of his fine library was very remarkable. After his death, the senate of Venice set its seal upon his manuscripts, and took away all that related to

to the affairs of the republic, amounting to 200. There were besides 14 chests of MSS., which, with 116 chests of printed books, were embarked in three ships to be conveyed to Naples, where his heirs resided. One of them fell into the hands of the corsairs, who, considering the books as mere lumber, threw them overboard; the rest were scattered on the beach at Fermo, which was entirely covered with papers. These were totally disregarded, till the bishop of the place having collected all he could, sent them to Naples. In this state the library was purchased by cardinal Borromeo at the price of 3400 gold crowns.

**PINES**, *Island of*, in *Geography*, a small island on the N.W. of Terra Firma, about 41 leagues E. of Porto Bello, which forms a good harbour, with two other small islands and the main land. N. lat.  $9^{\circ} 12'$ . W. long.  $80^{\circ} 15'$ . The river of Pines is five miles from the above harbour.

**PINES**, *Pinez*, or *Pinas*, an island in the Caribbean sea, near the S.W. coast of Cuba, about 25 miles long, and 15 broad. N. lat.  $21^{\circ} 30'$ . W. long.  $83^{\circ} 25'$ .

**PINES**, *Bay of*, a bay on the coast of West Florida. N. lat.  $30^{\circ} 20'$ . W. long.  $88^{\circ} 21'$ .

**PINES**, *Island of*, an island in the South Pacific ocean, near the coast of New Caledonia; about 15 or 16 miles in length, in a S.E. and N.W. direction, high in the central part, and sloping towards the extremities. S. lat.  $22^{\circ} 38'$ . E. long.  $167^{\circ} 38'$ .

**PINET**, ANTHONY DU, in *Biography*, lord of Norroy, who flourished in the 16th century, was a native of Befançon in the Franche Comté, concerning whom we know nothing but that he was zealously attached to the Protestant religion, in behalf of which he wrote several books. He was likewise author of "Plans, Draughts, and Descriptions of several Towns and Fortresses, as well in Europe, Asia, and Africa, as in the Indies and America, their foundations, antiquities, and manners of living, &c." He translated Pliny's Natural History in 2 vols. folio, and many other works of repute. Bayle. Moreri.

**PINETUS**, in *Ancient Geography*, a town of Spain, on the route from Bracara to Asturica, between Ad Aquas and Roboretum, according to Antonine's Itinerary, attributed by Ptolemy to the Callaici.

**PINETZKOI**, in *Geography*, a town of Russia, in the government of Archangel, on the Dwina; 60 miles S.S.E. of Archangel.

**PINEVILLE**, a town of America, in South Carolina, in St. Stephen's district, which has a flourishing academy, between 20 and 30 dwelling houses, 150 white inhabitants, and 300 negroes. In its vicinity is a valuable quarry of brown iron-stone, the only one found in the low country of Carolina.

**PINEY**, a town of France, in the department of the Aube, and chief place of a canton, in the district of Troyes; 12 miles N.E. of Troyes. The place contains 1456, and the canton 5920 inhabitants, on a territory of 250 kilometres, in 13 communes.

**PING-CHAN**, a city of Corea; 35 miles S. of Hoang-teheou.

**PING-CHAN-PO**, a small island, with a town, near the S. coast of Corea. N. lat.  $34^{\circ} 8'$ . E. long.  $126^{\circ} 22'$ .

**PING-HAL**, a town of Corea; 115 miles S.E. of King-ki-tao. N. lat.  $36^{\circ} 47'$ . E. long.  $128^{\circ} 41'$ .

**PING-ING**, a town of Corea; 40 miles S. of Koang-teheou.

**PING-KING**, a city of China, of the first rank, in Koei-teheou. N. lat.  $26^{\circ} 38'$ . E. long.  $106^{\circ} 56'$ .

**PING-LIANG**, a city of China, of the first rank, in Chen-si. N. lat.  $35^{\circ} 35'$ . E. long.  $106^{\circ} 18'$ .

**PING-LO**, a city of China, of the first rank, in Quang-si. N. lat.  $24^{\circ} 22'$ . E. long.  $110^{\circ} 4'$ .

**PINGNAVIR**, a town of Africa, in Querimba. S. lat.  $11^{\circ} 55'$ . E. long.  $41^{\circ} 10'$ .

**PINGRE**, ALEXANDER-GUY, in *Biography*, a French mathematician and astronomer, was born at Paris in 1711. In 1727 he became a member of the canons regular of the congregation of France. He was intended for the church, but after a few years' study of theology he devoted himself entirely to the sciences. In 1749 he was appointed a member of the Academy of Sciences in Rouen, and was elected to fill the office of astronomer, and attained to first rate excellence. His earliest production, as an author, was the "Calculation of an Eclipse of the Moon," on the 23d of December 1749. In May 1753 he was elected correspondent of the Academy of Sciences at Paris, after having sent them an observation of the transit of Mercury, which he made at Rouen. He was next appointed librarian of the abbey of St. Genevieve, obtained the construction of an observatory, and was furnished by the abbot and chapter with a six-foot telescope, while he had the loan of an excellent quadrant from the academy. At the desire of Monnier, he next engaged in calculating "A Nautical Almanack," to enable navigators more easily to ascertain the longitude by means of lunar observations. He calculated a table of the eclipses visible of the sun and moon from the commencement of the Christian era to the year 1900, and afterwards a table of the eclipses visible from the northern pole to the equator, for a thousand years before our era. The utility of these labours for verifying historical dates, induced the Academy of Inscriptions to insert a part of them in the 42d volume of their Memoirs. He published the "State of the Heavens" for the year 1754; in this the moon's place was calculated with the utmost exactness according to the tables of Dr. Halley for noon and midnight, with the right ascension in seconds of time twice a day. In 1758 he published "A Memoir relating to the Discoveries made in the South Sea, during the Voyages of the English and French round the World." In 1760, Pingrè left France for the island of Rodriguez in the Indian ocean, to observe the transit of Venus that was to take place in the following year, and on the 6th of June of that year he made his observations, from which he concluded that the parallax of the sun was  $10''.2$ . At the same time the English astronomer Mason concluded from the observations which he made at the Cape of Good Hope, that the parallax was  $8''.2$ . La Lande, in his "Astronomy," published in 1764, adopted a medium between these conclusions, and supposed the parallax to be  $9''$ , in which he was followed by astronomers in general, till more numerous observations made on the transit of 1769 led to a different result. After the return of Pingrè from the East, he published a description of Pekin, in which he shewed the position of that capital from the result of a number of calculations of eclipses, and ascertained its longitude, by other calculations, with a degree of precision to which none of the labours of the scientific missionaries had any pretensions. In 1769 he sailed for the island of St. Domingo, on board the Isis man of war, to observe the transit of Venus, and performed the service committed to him in the most able and satisfactory manner possible. An account of this voyage, which proved of considerable importance to the science of geography, as well as astronomy, appeared in 1773, in two vols. 4to. After comparing the results of the immense number of calculations made by the observers of the transit in the year 1769, the sun's parallax has been concluded to be about  $8''.6$ . (See VENUS, *Transit of*.) In 1771, Pingrè made

made another voyage, on board the *Flora* frigate, with the view of extending the interests of geographical and astronomical knowledge, having with him, as the companion of his pursuits, the chevalier de Borda, a celebrated engineer and geometrician; and the account of their proceedings, observations, and experiments, was published in 1778, in two vols. 4to. In 1784, M. Pingrè published his *Cometography*, or historical and theoretical treatise on Comets, in two vols. 4to., which is his most considerable work, and contains calculations of the orbits of all the comets of which an account has been preserved. After a long life spent in the most important services to the world, he died in the month of May 1796, leaving behind him a high character for integrity, having enjoyed the esteem of the public as well as that of his friends. He was author of many other works besides those that have been already noticed.

PING-TCHAI, in *Geography*, a town of Corea; 40 miles W. of Ou-tchuen.

PING-TCHANG, a town of Corea; 63 miles E. of King-ki-tao.

PINGUAGUEM, a river of Africa, which runs into the Zambeze, S. lat. 18° 10'.

PINGUEDO, in *Anatomy*, the Latin term for fat.

Some restrain pinguedo only to that humid soft kind of fat found in animals, next under the skin. See *ADIPS*.

PINGUICULA, in *Botany*, the diminutive of *pinguis*, fat, which alludes to a peculiar appearance of greasiness upon the leaves; whence arose the English name of Butterwort, and the French one of *Graffette*, for the plant in question.—Linn. Gen. 13. Schreb. 19. Willd. Sp. Pl. v. 1. 109. Mart. Mill. Dict. v. 3. Sm. Fl. Brit. 26. Ait. Hort. Kew. v. 1. 44. Juss. 98. Lamarck Illustr. t. 14. Gært. t. 112.—Class and order, *Diandria Monogynia*. Nat. Ord. *Corydalis*, Linn. according to his own opinion, but we should rather have referred it to his *Personate*; akin to *Lyfimachia*, Juss. rather to his *Pediculares*; the flower agrees best with the latter, the fruit with the former. Its proper place however is in the new order of *Lentibularia*, founded by Richard, and adopted in Brown's Prodr. Nov. Holl. v. 1. 429.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, small, permanent, ringent; upper lip erect, three-cleft; lower reflexed, divided. *Cor.* of one petal, ringent; its border more or less equally five-cleft. Nectary a spur, elongated from the base of the petal behind. *Stam.* Filaments two, cylindrical, curved upwards, shorter than the calyx; anthers roundish, clapped close to the stigma. *Pist.* Germen superior, globose; style very short; stigma two-lipped, the upper lip larger, flat, reflexed, covering the anthers, the lower very narrow, erect, cloven, shortest. *Peric.* Capsule roundish or ovate, bursting at the top by two valves, with one cell. *Seeds* numerous, cylindrical. *Recept.* central, unconnected.

Eff. Ch. Corolla ringent, spurred. Calyx two-lipped, in five segments. Stigma two-lipped. Capsule superior, of one cell, with many seeds.

1. *P. lusitanica*. Pale Butterwort. Linn. Sp. Pl. 25. Engl. Bot. t. 145. (*P. villosa*; Lightf. Scot. 77. t. 6. *Viola palustris*, *Pinguicula dicta*, *lusitanica*; Griseb. Virid. 84.)—Nectary obtuse, shorter than the nearly regular petal. Flower-stalk hairy. Capsule globose.—Native of Portugal according to Griseb, whose plant we have verified. It is found also on the borders of bogs in Dorsetshire, Hampshire, Devonshire, and Cornwall, as well as in the west of Scotland and Ireland. It is perennial, flowering in June and July. Like all the rest of its genus this herb is desti-

tute of a *stem*, the *leaves* being radical, spreading, ovate, obtuse, viscid, pale with red reticulated veins; their edges involute. *Stalks* several, erect, simple, slightly hairy, three or four inches high, each bearing an elegant little *flower*, whose limb is of a pale lilac, in five nearly equal, emarginate segments, the tube yellow, streaked with red, hairy at the mouth. *Stigma* very unequally two-lipped, concave. *Capsule* exactly 3-lobular. The shape of the part last mentioned affords excellent specific characters in this genus, but is not uniform enough in all to enter into the generic description.

2. *P. crystallina*. Crystalline Butterwort. Sm. Fl. Græc. Sibth. v. 1. 8. t. 11.—Nectary obtuse, shorter than the very irregular six-cleft petal. Segments of the calyx oblong. Flower-stalk smooth at the base.—Gathered by Dr. Sibthorp and Mr. Ferdinand Bauer, in watery places near Camandria, in the isle of Cyprus. Differs from the former in its uniformly glaucous *leaves*, unmarked by red veins, but distinguished by a glandular crystalline clothing like the ice-plant. The *flowers* are similar in colour to *P. lusitanica*, but very different in structure; the segments of their *calyx* being almost linear, not broadly ovate; and the limb of their *corolla* distinctly two-lipped, its upper lip short, in two divaricated lobes, the lower much broader and longer, in three lobes, the middle lobe deeply cloven. The *germen*, and probably the *capsule*, is globose.

3. *P. vulgaris*. Common Butterwort. Linn. Sp. Pl. 25. Fl. Dan. t. 93. Engl. Bot. t. 70. (*P. five Sanicula Eboracensis*; Ger. Em. 788.)—Nectary cylindrical, acute, as long as the very irregular five-cleft petal. Segments of the calyx oblong. Capsule ovate. Common on the bogs of Europe, flowering with us in May and June. Larger than either of the foregoing. The tube and spur of the *corolla* are pale purple, but the limb is deep blue, in five rounded segments, of which the two uppermost are much the smallest, the lower central one the largest, all of them entire. The viscid substance, found on the leaves, is said to be useful to anoint the dugs of cows when fore or injured; at least such is the report of old Gerard, and hence came the name of Yorkshire Sanicle for this plant.

4. *P. grandiflora*. Large-flowered Butterwort. Willd. n. 3. Decand. Fl. Franc. v. 1. 250. v. 3. 575. Lamarck Dict. v. 3. 22. Illustr. t. 14. f. 2. Engl. Bot. t. 2184.—Nectary cylindrical, acute, as long as the nearly regular, five-cleft, veiny petal. Segments of the calyx ovate, obtuse. Capsule ovate.—Native of France and Ireland. It was discovered by Mr. Drummond, curator of the botanic garden at Cork, in marshy ground in the west part of that county, very abundantly, flowering in May. The *leaves* are nearly twice as large as *P. vulgaris*, which is not found in that neighbourhood. *Flowers* also twice the size of that species, on stronger more viscid *stalks*. *Corolla* much more equally divided, and particularly distinguished by its fine reticulations of dark-blue veins.

5. *P. alpina*. Alpine Butterwort. Linn. Sp. Pl. 25. Fl. Lapp. ed. 2. 11. t. 12. f. 3. Fl. Dan. t. 453. Gunn. Norv. fasc. 2. 71. t. 4. f. 4.—Nectary conical, deflexed, shorter than the tube of the very irregular five-cleft petal. Capsule oblong, beaked.—Native of the alps of Lapland, Switzerland, and Austria, flowering in June, earlier in that country than the *vulgaris*, according to Gunner. It is like that species in foliage, but rather smaller, and essentially different in *spur* and *capsule*. The *corolla* is white, with a yellow palate; its segments very unequal, rounded, undivided.

6. *P. villosa*. Little Hairy Butterwort. Linn. Sp. Pl. 25. Fl. Lapp. ed. 2. 12. t. 12. f. 2. Lapland Tour,

v. 1. 255. v. 2. 109.—Nectary awl-shaped, shorter than the petal. Capsule inversely heart-shaped, compressed. Flower-stalk hairy.—Gathered by Linnæus amongst bog-moss in Lapland, but rarely. It has also been found occasionally in Norway and Siberia. This is much smaller than any of the foregoing, flowering in May or June; the foliage being withered, and seed ripe, by July. The *leaves* are rounded and three-ribbed. *Stalk* slender, straight, finely hairy or downy. *Corolla* pale violet. *Capsule* emarginate. Linnæus originally confounded Ray's synonyms of the *lusitanica* with the present species, which by that means came to be reckoned a British plant.

PINGUIN, a West Indian name, adopted as generic by Dillenius, in Hort. Elth. 320. t. 240. See BROMELIA, n. 4.

PINGUIN, in *Ornithology*, is made a distinct genus of birds, of the order of web-footed, by Mr. Pennant; the characters of which are, that the bill is strong, straight, and bending a little towards the point; the tongue is covered with strong sharp spines, pointing backwards; the wings are very small, pendulous, useless for flight, and covered with mere flat shafts; the body is covered with thick short feathers, with broad shafts, placed as compactly as scales; the legs are short and thick, placed quite behind; the toes are four, standing forward, the interior loose, the rest webbed; and the tail is very stiff, consisting only of broad shafts. He has enumerated and described three species; viz. 1. The Patagonian penguin, which inhabits an isle near the Cape of Good Hope, on the coasts of New Guinea, the isle of Desolation, south of the Cape, the southern parts of America, and the seas among the ice, as high as south lat.  $64^{\circ} 12'$ , long.  $38^{\circ} 14'$  east. It lives much at sea; the wings act as fins; it burrows on land, and is analogous to seals. The name penguin is given to these birds, he says, *propter pinguedinem*, on account of their fatness; and he observes, that it has been corrupted to *penguin*; so that some, imagining it to be a Welch word, signifying *white head*, entertained some hopes of tracing the British colony, said to have migrated into America, under Madoc Gwineth, son of Owen Gwineth, A.D. 1170. But he adds, as the two species of birds that frequent that coast have black heads, we must resign every hope, founded on that hypothesis, of retrieving the Cambrian race in the new world. 2. The lesser penguin, diomedea demersa of Linnæus, or aser Magellanicus of Clusius. And, 3. The red-footed penguin, the phæton demersus of Linnæus, inferior to the last in size, with a thick, arched red bill; plumage like the former in texture; the head, hind part of the neck, and the back, of a dusky purplish hue, and breast and belly white; brown wings, with the tips of the larger feathers white: instead of a tail, a few black bristles; and red legs. It is found on Pinguin isle, near the Cape of Good Hope. Phil. Trans. vol. lvi. art. 14. See ALCA and APTEODYTA.

PINHEIRA *de Azere*, in *Geography*, a town of Portugal, in the province of Beira, on the Mondego; 15 miles S.W. of Viseu.

PINHEL, a town of Portugal, in the province of Beira, situated on a mountain, and fortified; containing six parish churches, and about 1600 inhabitants; seven miles N.E. of Almeida. N. lat.  $40^{\circ} 33'$ . W. long.  $6^{\circ} 44'$ .

PINHONES INDICI, the name by which the Portuguese call the purging nuts, as they are called, of America; the fruit of the *jatropha foliis cordatis angulatis* in the Linnæan system, or the *ricinoides* and *curcas* of other writers. It is called Barbadoes nut; and has an oval, walnut-like fruit,

with oblong black seeds. Their taste is sweetish, nauseous, and acrid; and they are powerful evacuants. In America it is said to be taken in considerable quantities, and to purge without much inconvenience. See *PINEI nuclei*, &c.

PINION, in *Mechanics*, an arbor, or spindle, in the body whereof are several notches, into which catch the teeth of a wheel that serves to turn it round.

Or a pinion is a lesser wheel, which plays in the teeth of a larger. See WHEEL.

In a watch, &c. the notches of a pinion (which are commonly 4, 5, 6, 8, &c.) are called *leaves*, and not teeth, as in other wheels.

PINION of Report is that pinion, in a watch, which is commonly fixed on the arbor of a great wheel, and which in old watches used to have but four leaves; it drives the dial-wheel, and carries about the hand.

The quotient, or number of turns, to be laid upon the pinion of report, is found by this proportion: as the beats in one turn of the great wheel are to the beats in an hour; so are the hours of the face of the clock (*viz.* 12, or 24) to the quotient of the hour-wheel or dial-wheel divided by the pinion of report, that is, by the number of turns which the pinion of report hath in one turn of the dial-wheel; which, in numbers, is  $26928 : 20196 :: 12 : 9$ .

Or rather thus: as the hours of the watch's going are to the numbers of the turns of the fusee; so are the hours of the face, to the quotient of the pinion of report. If the hours be 12, then  $16 : 12 :: 12 : 9$ . But if 24, the proportion is  $16 : 12 :: 24 : 18$ .

This rule may serve to lay the pinion of report or any other wheel, thus: as the beats, in one turn of any wheel, are to the beats in an hour; so are the hours of the face, or dial-plate, of the watch, to the quotient of the dial-wheel, divided by the pinion of report, fixed on the spindle of the aforesaid wheel. See CLOCK and MOVEMENT.

PINION, *Flying*. See FLYING.

To PINION is to bind the hands or arms of a person, so as to prevent his having the free use of them.

PINIROLO, in *Ornithology*, the name of a bird of the tringa kind, somewhat approaching to the sand-piper, but larger; its beak is little more than a finger's breadth long, and black; it is of a mixed chestnut colour, and brown on the back; and its belly and breast are perfectly white: it is common in the Italian markets, and very much resembles the common tringa.

PINITE, in *Mineralogy*, a species of the clay genus, is of a blackish-grey colour, which is frequently covered, on the surface and in rents, with iron ochre. It occurs seldom massive; is almost always crystallized, and that in six-sided prisms, with truncated lateral edges and angles; sometimes the truncating edges are so numerous, that the crystal acquires a roundish aspect. The crystals are frequently middle-sized, sometimes small, and they frequently intersect each other. The external lustre is not at all certain; internally it is glistening, and its lustre is resinous. Its longitudinal fracture is small-grained and uneven; the cross-fracture is imperfect and foliated. The fragments are indeterminately angular, sometimes blunt-edged. On the edges it is slightly translucent; it is soft, easily frangible, and not particularly heavy; the specific gravity, according to Kirwan, is 2.98. With regard to its chemical character, it experiences no alteration before the blow-pipe, either alone or with the addition of borax. With carbonate of soda it forms an opaque scorizeous globule; and with microcosmic salt, it makes a transparent opalescent glass. It consists of

Alumine

P I N

Alumine	63.75
Silica	29.50
Oxyd of Iron	6.75
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	100.00
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It has been hitherto found only in the mine called Pini, at Schneeberg in Saxony, and from the mine it derives its name; it is usually accompanied with quartz, feldspar, and mica.

PINK, in *Botany, Gardening, &c.* See DIANTHUS.

PINK, *Indian*, a species of *ipomoea*; which see.

PINK, *Indian*, is also a species of *lonicera*; which see.

PINK, *Montpelier*. See APHYLLANTHUS.

PINK, *Sea*. See THRIFT.

PINK, *Brown*, among *Painters*, is the tinging part of some vegetable of a yellow or orange-colour, precipitated upon the earth of alum, cuttle-fish bone, or some similar calcareous substance. When good, it is a concentrated yellow, which, as a pigment, is transparent in oil, gives the effect of a dark colour, and serves for deep shades. There are many methods of preparing brown pink. One of the best and most common methods is the following: take of the French berries, one pound; of fustic wood in chips, half a pound; and of pearl-ashes, one pound. Boil them in a tin boiler, with a gallon and a half of water, for an hour; and then strain off the tincture through flannel, while the fluid is boiling hot. Having prepared in the mean time a solution of a pound and a half of alum, put it gradually to the tincture, as long as an ebullition shall appear; wash the sediment, as in the preparation of lakes (which see); and when it is brought, by filtering through paper with a linen cloth, to a proper consistence, dry it on boards in square pieces. Or, it may be made without the use of salts, by boiling two pounds of the berries in a gallon of water for two hours, and straining off the tincture through flannel. In the mean time prepare a pound and a half of cuttle-fish bone, by levigating the soft inner part with water on a marble; add this to the tincture, and evaporate them in balneo Mariæ till the matter becomes of a stiff consistence: when the whole has been well mixed by grinding, let it be laid on boards to dry.

The goodness of brown pink must be judged of by its transparency, and force of colour, when mixed with oil; but its qualities of standing well, and not fattening in oil, in both which respects it is commonly defective, can only be ascertained by trial and experience.

PINK, *Dutch*, is a pigment formed of chalk, coloured with the tinging particles of French berries, or other vegetables. It is principally used for coarser purposes in water. It may be made by boiling one pound of French berries, and four ounces of powdered turmeric root in a gallon of water for two hours, and then straining off the tincture through flannel, and boiling it again with an ounce of alum, till it be evaporated to one quart. Prepare in the mean time four pounds of chalk, by washing it over, and afterwards drying it; and mix the chalk with the tincture, by grinding them together, and then dry it on boards. It is sometimes prepared in the same manner with starch and white lead. Its goodness consists in its being of a full gold-coloured yellow, and very bright.

PINK, *English*, is only a lighter and coarser kind of Dutch pink; and may be prepared in the same manner, the quantity of chalk being increased in proportion, as it is intended to be inferior to the Dutch.

PINK, *Light*, is of two kinds; the one being the same with the Dutch pink, only with much less colour, so that

P I N

the proportion of the French berries and turmeric must be lessened to one-half: the other is the same with the brown pink, that is, transparent in oil, but with less colour. It may be prepared by boiling one pound of French berries in a gallon of water, for an hour, and adding to the strained fluid two pounds of pearl-ashes, dissolved and purified, by filtering through paper; then precipitate with alum dissolved in water, by adding the solution gradually, till the ebullition ceases; and proceed as with brown pink.

PINK, *Rose*, is a lake, the earth or basis of which is principally chalk, and the tinging substance is extracted from Brasil or Campeachy wood. This pigment, which does not stand, is seldom employed, except for the coarse work of house-painters, or for paper-hangings, and sometimes with varnish. It may be prepared by boiling six pounds of Brasil wood, or three pounds of Brasil and three of Campeachy wood, in three gallons of water, in which a quarter of a pound of alum has been dissolved, for an hour. Purify the fluid, by straining through flannel, and put back the wood into the boiler with the same quantity of alum, and proceed as before; repeating the operation a third time; mix the three quantities of tincture together, and evaporate them till only two quarts of fluid remain. Prepare eight pounds of chalk, by washing it over in water, in which a pound of alum has been dissolved, and afterwards fusing the chalk from the salt, formed by the alum, and drying it to the consistence of a stiff clay. Grind the chalk and tincture together; and lay the mass dry out of the sun or cold air. The goodness of rose pink consists chiefly in the brightness of the colour, and fineness of its substance.

PINK, *Pinque, Fr.* in *Sea Language*, is a name given to a ship with a very narrow stern; whence all vessels, however small, whose sterns are fashioned after this manner, are called *pink-sterned*.

*Pinks* are Mediterranean vessels, which differ from the xebec only in being more lofty, and not sharp in the bottom, as they are vessels of burthen. They have long narrow sterns, and three masts, carrying latteen-sails.

PINKUFELT, in *Geography*, a town of Hungary; 10 miles W. of Steinam Anger.

PINKZOW, a town of Poland, in the palatinate of Sandomirz; 52 miles W. of Sandomirz.

PINNA, or PENNA, a Latin word signifying a feather. It is also used figuratively, in divers arts, to express things which bear some resemblance, in form, to feathers; as the fins of fishes, &c. See FIN.

PINNA, *the Nacre*, in *Conchology*, a genus of the class and order Vermes Testacea. The generic character is; animal a limax; shell bivalve, fragile, upright, gaping at one end, and furnished with a byssus or beard; the hinge is without teeth, the valves are united in one. The inhabitants of these shells produce a large quantity of fine and very strong byssus, which by the Italians is woven into a sort of silk. The shells of all the species, of which there are eighteen, are generally found standing erect in the smoother waters of the bays, with the larger end a little open. The fish of many of them are highly esteemed as food.

Species.

RUDIS. Shell vaulted, with arched scales arranged in rows. There is a variety: the *first* inhabits the American and Atlantic oceans, is from twelve to sixteen inches long, and from four and a half to eight broad; the shell is red, and it has from six to eight grooves. The *second* is found in the Indian and Red seas; it is black, with scarcely any visible grooves.

PECTINATA. Shell longitudinally striate half way; one

side slightly wrinkled transversely. There is a variety of this species. They are both found in the Indian ocean; the *first* is about three inches long and four broad; the shell is triangular, horny. The *second* is four and a half inches long, two and a half broad, thinner and more rare.

**NOBILIS.** Shell striate, with scales. There are four varieties of this species. They are found in the Mediterranean, Adriatic, and American seas. The shell of this species is seven inches and a half long, and three and a half broad: it is brown, the exterior margin rounded; the scales are larger towards the edges, and near half an inch long; one-half of the valves is ribbed, the other has transverse wrinkles, which at the broader part are crossed with striæ.

\* **MURICATA.** Shell striate, with concave, ovate, acute scales. This is described and figured in Mr. Donovan's British Shells; it is the *P. fragilis* of Pennant. It is a native of the European and Indian seas, is from three to nine inches long, and one-third as broad; the shell is thin, brittle, pellucid, and horny; the outside is formed with longitudinal ribs, rough with rows of small prickles.

**ROTUNDATA.** Shell with obsolete scales, the margin rounded. It inhabits the Mediterranean; it is sometimes above two feet long; the shell is oblong, whitish, with perpendicular, undulate, parallel wrinkles, and very fine, concave, acute, scattered scales on the broader part.

**SQUAMOSA.** Shell with very fine undulate scales, and flexuous broad wrinkles; the smaller end is pointed and naked. It inhabits the Mediterranean, is about thirteen inches long, and half as broad. In colour it is a little chestnut at the larger end, and whitish at the smaller one; the external margin is angular.

**CARNEA.** Shell thin, flesh colour, naked, longitudinally grooved; the external margin is acute and rounded. Its habitation is not known; it is sometimes varied with white spots.

**SUCCATA.** Shell smooth, satchel-shaped, and a little erect. It inhabits the Mediterranean and Indian seas; is five and a half inches long, and half as broad; the shell is thin, above it is reddish, beneath whitish, above flat, with a rounded margin, beneath gibbous, without scales, but marked with ten broadish, longitudinal striæ.

**DIGITIFORMIS.** Shell smooth, tubular, finger-shaped, incurved, the extreme margin membranaceous. It is a native of India. The shell is flattish, oblong, and pellucid.

**LOBATA.** Shell naked, lobed. Found in India. The shell is of a straw colour, with purple striæ, membranaceous and heart-shaped when the valves are open. The lateral lobes rounded and broader, with a sort of nerve from the hinge to the lobes, and from the nerve there are lateral lines.

**VITREA.** The shell of this species is hyaline, with longitudinal striæ, the striæ with a few scales, are crossed by other transverse striæ at the margin. It inhabits the Indian ocean, but is very rare.

**INCURVA.** Shell narrow, long, naked, carinate, with transverse undulate wrinkles. It inhabits the Indian ocean; pale horn colour, curved at the hinge, and marked with a few longitudinal striæ.

**BICOLOR.** Shell thin, inflected at the lateral margin, yellowish, with black-brown rays; with a few longitudinal striæ. It inhabits the Red sea. It is of a horn colour, long, with a few transverse curved striæ at the margin, the larger end is rounded.

**LÆUSTA.** Shell flattish, horny, with blackish rays, spots, and clouds, and many smooth striæ. It is rare, but sometimes found in the southern ocean of India.

**VEXILLUM.** Shell truncate at the outer margin, dilated, naked, horny, with a few black clouds; longitudinally striate on the fore-part, and transversely wrinkled behind. It inhabits India, and is extremely rare. The shell appears as if it were winged, with a curved lateral margin.

**PAPYRACEA.** Shell very thin, brittle, horny, with longitudinal ribs, the extreme margin roundish. This is a native of the Indian ocean: the back of the ribs is sometimes scaly; in the middle of the shell is a violet-brown spot, and a few transverse wrinkles at the lateral margin.

**SANGUINEA.** Shell flattish, and slightly incurved: it is red, with a few perpendicular smooth striæ. The shell is three inches long: it is probably a variety only of some other species.

**BULLATA.** The shell of this species is very straight, thin and perpendicularly striate, with transverse spinous wrinkles at the lower margin. This, like the last, is thought not to be a distinct species.

**PINNA Auris**, in *Anatomy*. See EAR.

**PINNA Nasi**, is the fame as ala nasi. See NOSE.

**PINNACE**, a small vessel, navigated with sails and oars, and carrying generally two masts; chiefly used as a scout for intelligence, and for landing of men.

One of the boats belonging to a great man of war, serving to carry the officers to and from the shore, is also called the pinnace. It resembles a barge, but never rows more than eight oars, whereas a barge properly never rows less than ten. Pinnaces are for the accommodation of lieutenants, &c. as barges are for admirals, and captains of ships of war.

**PINNACLE**, from *pinna*, or *pinnaeculum*, in *Architecture*, the top or roof of a house, terminating in a point.

This kind of roof among the ancients, was appropriated to temples; their ordinary roofs were all flat, or made in the platform-way.

It was from the pinnacle, that the form of the pediment took its rise.

\* **PINNACLE Island**, in *Geography*, an island in the North Pacific ocean, so named by Capt. Cook from the termination of its elevated summit in several pinnacle rocks. N. lat. 60° 25'. E. long. 186° 40'.

**PINNACLE Point**, a cape on the S.E. coast of Alaska, so called by Capt. Cook in 1778. N. lat. 55° 10'. E. long. 198° 5'.

**PINNACLE Islands**, two small Japanese islands. N. lat. 29° 52'. E. long. 132°.

**PINNÆ, Aculei Pinnarum**, in *Ichthyology*. Every apophysis, or eminence on the head or body of a fish, which is so sharp at the end as to be capable of pricking, is called an aculeus; but the aculei pinnarum in particular are those prickly radii or bones, which serve to support the fins; and being carried out beyond the rim of the membrane, end in so many points.

These aculei are simple cylindric officles; whereas the other officles, which sustain the fins, are less rigid, and are bent and not prickly; and these are not simple, but are composed each of two officles, closely cohering one to another. Many of these radii are divaricated at their extremity into two, three, or more branches; these, when they are carried out beyond the rim of the membrane, are harmless, and are seen to be composed of two officles, as the body of the radius is. The aculei of the back and belly of all fishes are so far of the same nature, that they never stand single, as some have supposed them to do in particular instances; but they are always connected one to the other at the bottom by a membrane, though that be ever so small and low, as in some it is scarcely visible. See *Anatomy of FISH*.

PINNA-

**PINNAMQUAM**, in *Geography*, a small stream in Washington county, and state of Maine, which gives name to a new settlement.

**PINNARUM Dilator Proprius**, in *Anatomy*, a name given by Santorini to one of the muscles of the face, which he has also called myrtiformis nasi, and which Cowper has called depressor labii superioris, five constrictor aë nasi, and Albius the depressor aë nasi.

**PINNARUM Radii**. See **RADII Pinnarum**.

**PINNATED LEAF**, among *Botanists*. See **LEAF**.

**PINNATIFID LEAF**. See **LEAF**.

**PINNATIPEDES**, or *Fin-footed Birds*, in *Ornithology*, an order of birds, the characters of which are; that the bill, body, and mode of life resemble those of the waders or gallæ; the thighs are likewise naked for the lower half, and the feet are fitted for wading in marshes, all the toes being divided; but the toes are edged on each side with a membrane for their whole length. These birds mostly live in pairs while breeding, and construct very large nests of various leaves and grass in their marshy haunts. The genera are *Pbalaropus*, *Fulica*, and *Podiceps*; which see.

**PINNATUS**, in *Heraldry*, a term used by the Latin writers on these subjects, to express that sort of line in arms which is called by our heralds the embattled line, or crenelle. It is also called by some *linea pinnis asperata*, and by Sylvester Petro Sancto *murales pinnule*. When this line is only embattled on one side, it is properly expressed by this word; but when it is embattled on both sides, as in some arms, it is called *breteffe*, and *contre breteffe*.

**PINNAW**, in *Geography*, a river which runs into the Elbe; 20 miles below Hamburg.

**PINNE**, a town of the duchy of Warsaw; 24 miles W. of Posen.

**PINNEBERG**, a town of the duchy of Holstein, capital of a lordship; eight miles N.W. of Hamburg. N. lat. 53° 43'. E. long. 9° 54'.

**PINNEYRAH**, a town of Hindoostan; 12 miles N.N.W. of Benares.

**PINNING**, in *Building*, the fastening of tiles together, with pins of heart of oak; for the covering of a house, &c.

**PINNIRAPI**, in *Antiquity*, an order of gladiators, who being matched with the Samnites, used to catch at the pinnæ which adorned their helmets, and bear them off in triumph, as marks of victory.

**PINNOW**, in *Geography*, a town of Hinder Pomerania; six miles N.E. of Plate.—Also, a lake of Brandenburg, in the Middle Mark, near Oranienburg.

**PINOLA**, or **PINGOLA**, a town of Mexico, in the province of Guatimala; 75 miles E. of Guatimala.

**PINOLS**, a town of France, in the department of the Upper Loire, and chief place of a canton, in the district of Brioude. The place contains 747, and the canton 3580 inhabitants, on a territory of 210 kilometres; in nine communes.

**PINOS**, a town of Spain, in the province of Grenada; five miles E. of Grenada.—Also, an island near the S. coast of Cuba, resembling a horse-shoe in its figure, about 75 miles in circuit, mountainous and covered with pines. N. lat. 21° 32'. W. long. 82. 10'.

**PINOS**. See **PINES**.

**PINOSA**, a town of the island of May.

**PINSHOWITZ**, a town of Bohemia, in the circle of Leitmeritz; seven miles S. of Aulfig.

**PINSK**, a town of Russian Lithuania, in the palatinate of Brzesc, surrounded by morasses. Jews are numerous, and the Greeks have a bishop; the chief manufacture is

that of dressing Russian leather; 84 miles E. of Brzesc. N. lat. 52° 12'. E. long. 25° 53'.

**PINSSON, FRANCIS**, in *Biography*, a learned jurist, son of a professor of law of the same name, was born at Bourges in 1612. He was admitted an advocate in the parliament of Paris in 1633; but he was particularly distinguished for his great knowledge of the law of benefices, in which he was regarded as the oracle, and which he illustrated by several learned works. Of these were "Traité des Benefices;" "La Pragmatique Sanction de St. Louis, et celle de Charles VII. avec Commentaires;" "Notes sommaires sur les Indults accordés à Louis XIV. &c.;" "Traité des Regales," 2 vols. 4to. which is said to be a very learned and useful performance. This industrious writer died at Paris in 1691. Moreri.

**PINT, PINTA**, a vessel or measure used in estimating the quantity of liquids, and even sometimes of dry things.

Budæus derives the word pint from the Greek *πινθα*; others from the German *pint*, a little measure of wine; Nicod from the Greek *πινω*, to drink.

The English pint is three-fold; the one for wine measure, another for beer and ale measure, and a third for dry measure.

The wine pint is said to contain a full pound, avoirdupois, of common running water; two pints make a quart, two quarts a pottle, two pottles a gallon, &c.; a hoghead is  $8\frac{2}{3}$  cubic feet; a gallon 231 cubic inches; and a pint  $28\frac{2}{3}$  cubic inches. See **MEASURE**, and **TUN**.

In the English ale and beer measure, the pint is the eighth part of a gallon, or 282 cubic inches; consequently contains  $35\frac{1}{4}$  cubical inches. See **GALLON**.

As to the pint used in Scotland, there are different opinions concerning the number of cubical inches it contains. Dr. Gregory makes them 109; others, from several careful mensurations of the standard kept at Edinburgh, make the Scotch pint to contain  $103\frac{2}{3}$ ; and those in common use are said to contain betwixt 105 and 106 cubical inches. Another experiment was made with a cask, which was found to contain  $46\frac{2}{3}$  Scotch pints, and  $18\frac{1}{6}$  English ale gallons. Supposing this mensuration just, the Scotch pint will be to the English ale gallon as 289 to 750; and if the English ale gallon be supposed to contain 282 cubical inches, the Scotch pint will contain 108.664 such inches. The Scotch pint, according to the standard sterling jug, is 103.404 English cubic inches: hence 105 Scotch pints = 47 English wine gallons, and 11 Scotch pints = 6 English ale gallons. The Scotch quart is commonly reckoned about  $\frac{7}{8}$ th less than the English wine gallon, and about  $\frac{1}{4}$ th less than the English ale gallon; and 1 pint = 2 choppins; and 1 choppin = 2 mutchkins; and 1 mutchkin = 4 gills. See **MEASURE**.

The Paris pint, according to the old system, is estimated at one-sixth of the ancient congius, and contains two pounds of common water, and is therefore nearly equal to an English wine quart; it is divided into chopines, which some call septiers; the septier into two demi-septiers; the demi-septier into two poissions, each poission containing six cubic inches. Two pints make a quart, quarteau, which some call a pot; the pint of St. Denis is almost double that of Paris. See **MUID**.

At Genoa 100 pinte, wine measure, are equal to 2 barrili = a mezzarola = about 39 English gallons. For a comparison of the liquid, &c. measures of different countries, see **MEASURE**.

**PINTADO**, or *Afra avis*, in *Ornithology*, a name given by the ancient Roman authors to the Guinea-hen. See **NUMIDA**; see also **PROCELLARIA Capensis**.

PIN-TAIL, or *Anas Acuta*. See DUCK.

PINTARD'S SOUND, in *Geography*, a bay on the W. coast of North America, the mouth of which extends from cape Scott on the southern side, in N. lat.  $50^{\circ} 56'$ , and W. long.  $128^{\circ} 57'$ , to Point Disappointment, in N. lat.  $52^{\circ} 5'$ , and W. long.  $128^{\circ} 50'$ : it contains many small islands.

PINTCHLUKO RIVER, a large branch of the Chata Uche, the upper part of Appalachian river.

PINTLE, in *Artillery*, a long iron bolt, fixed upon the middle of the limber bolster, to go through the hole made in the trail-tranform of a field carriage, when it is to be transported from one place to another. The hole through which the pintle passes is wider above than below, in order to leave room for the pintle to play in.

PINTLE-Plate, is a flat iron, through which the pintle passes, and nailed to both sides of the bolster, with eight diamond-headed nails.

PINTLE-Washer, an iron ring, through which the pintle passes, placed close to the bolster for the trail to move upon.

PINTLE, *Priest's*, in *Botany*. See WAKE Robin.

PINTLES, in *Ship Building*, straps of mixed metal or iron, fastened on the rudder in the same manner as the braces on the stern-post, into which they hang the rudder by a stout pin or hook at the fore end: thus the rudder turns or traverses as upon hinges, from side to side. Sometimes one or two are shorter than the rest, and work in a socket-brace, whereby the rudder turns easier. The latter are called *dumb-pintles*.

PINTO, THOMAS, in *Biography*, an excellent performer on the violin, born in England of Italian parents. He was a miraculous player on his instrument when a boy; and long before manhood came on, was employed as the leader of large bands in concerts. He was, however, when Giardini arrived in England, very idle, and inclined more to the fine gentleman than the musical student; kept a horse; was always in boots of a morning, with a switch in his hand instead of a fiddle-stick. But after hearing Giardini, who was superior to all other performers on his instrument with which he was acquainted, he began to think it necessary to practise, which he did for some time with great diligence. With a powerful hand, and marvellous quick eye, he was in general so careless a player, that he performed the most difficult music that could be set before him, better the first time he saw it, than ever after. He was then obliged to look at the notes with some care and attention; but, afterwards trusting to his memory, he frequently committed mistakes, and missed the expression of passages, which, if he had thought worth looking at, he would have executed with certainty. After leading at the opera, whenever Giardini laid down the truncheon, he was engaged as first violin at Drury-lane theatre, where he led during many years. He married for his first wife Sybilla, a German under-singer at the opera, and sometimes employed in burlettas at Drury-lane. After her decease, he married the celebrated Miss Brent, and, quitting England, settled in Ireland, where he died in December 1782, aged 53 years.

His accuracy in playing at sight was so extraordinary, that he even astonished Bach and Abel by the extent of this faculty; and to embarrass him, if possible, they composed jointly a concerto for the violin, with solo parts as difficult as they could invent; and, carrying it to Vauxhall as soon as transcribed in separate parts, told him that they had just finished a concerto, of which, as it was somewhat out of the common way, they wished to hear the effects, if he would venture to try it at sight. "Let me see it," says Pinto; and after a slight glance at the solo parts, and

picking his teeth in his usual way, he said if they pleased he would try it as his concerto for the night. And the eminent composers who wished to make this experiment, declared that they did not believe any of the greatest performers in Europe on the violin, would have played it better with a month's practice.

Pinto, who in playing an adagio seemed to have so much feeling and expression, was a Stoic at heart, equally indifferent to pain and pleasure. While he led the band at Drury-lane, during the most affecting scene of Garrick's capital tragic parts, he used to fall asleep in the orchestra full in his view, which, after our *genuine* Roscius had with indignation seen, he never rested till his place in the orchestra was supplied with a leader on whose feelings he had more power. Indeed, we remember a more ridiculous mortification happening to our ever-to-be-lamented friend, Garrick, from a sentinel at one of the stage doors, equally destitute of human feelings with Pinto, yawning aloud during the deepest distress of king Lear, which so completely turned "what should be great, to farce," that the vulgar part of the audience, being cocknies, burst into a loud *horse-laugh*; which so disconcerted and enraged the good old king, that he complained to the captain of the guard, and begged that so impenetrable a sentinel might never be placed again on the stage to make the audience laugh, whilst he was doing every thing in his power to make them cry.

Pinto died with the same indifference about worldly concerns as he had lived, and left his unfortunate widow, the once much famed Miss Brent, so literally a beggar, that she returned to England to solicit charity from the Musical Fund; which, alas! she did in vain: for by his having during several years neglected to pay his subscription, all her claims were annihilated in an establishment which she and her husband had often by their gratuitous performance contributed, at its annual benefits, to support, previous to its being enriched, and rendered a royal institution by the commemoration of Handel.

PINTO, in *Geography*, a town of Spain, in New Castile; 9 miles S. of Madrid.

PINTRAL, a town of Hindoostan, in the Carnatic; 26 miles S. of Ongole.

PINTURICCIO, BERNARDINO, in *Biography*, was born at Perugia in 1454, and was a disciple, and for some years associate, of Pietro Perugino. He painted in history and portraits, and was in so much esteem, that he was employed to paint the portraits of pope Pius II., and of Innocent VIII; of Giulia Farnese, Cæsar Borgia, and queen Isabella of Spain. His style, nevertheless, was extremely dry and Gothic, as he introduced gilding in the architectural and other parts of his pictures, and an over-laboured degree of finishing.

In his most memorable performance, the history of Pius II., painted in ten compartments in the library at Sienna, he is said to have been assisted by Raphael, then a very young man, and pupil of Perugino, who made some cartoons of the most material incidents, and sketched many parts of the compositions.

His last work was a Nativity for the monastery of St. Francis at Sienna; in which place he had a room assigned him to paint in, without the danger of his being interrupted; and out of which he requested every thing might be removed. Willing to indulge him, the monks caused all the furniture to be taken away, except an old chest, which, being greatly decayed, they did not attempt to move, as they were fearful of destroying it. Pinturiccio insisted, however, upon its removal; and the attempt was scarcely

scarcely made, when it broke to pieces, and a treasure of 500 pieces of gold was discovered concealed within it.

The joy of the monks was equalled only by the mortification of the painter, who was said to have died of chagrin soon after, at the age of 59.

PINTZOUA, in *Geography*, a town of Prussia, in the province of Pomerelia; 22 miles S.S.W. of Marienburg.

PINUS, in *Botany*, the fir, cedar, larch, &c. a most important and well-known genus of plants, two points in whose history have, nevertheless, been involved in great obscurity; these are the derivation of the generic name, and the nature and situation of the stigma of the flower. Linnæus places *Pinus* amongst ancient Latin names of unknown origin; and Martyn, like Ambrosinus, leaves it unexplained. The lexicographers are mostly content to refer to its Greek synonym  $\pi\acute{\iota}\nu\upsilon\varsigma$ ; and it is possible that both words had the same source. D. Theis deduces *Pinus*, very satisfactorily, from the Celtic, and shews it to exist, variously modified, in all the dialects of that ancient language, its basis being *pin* or *pen*, a mountain or rock; whence we have the Apennines; the Pennine Alps, &c. The Gallic *pinwidlen*, like the German *pyn-baum*, means precisely a mountain tree; than which nothing can be more appropriate. Of the stigma we shall treat in its proper place.—Linn. Gen. 499. Schreb. 651. Willd. Sp. Pl. v. 4. 494. Mart. Mill. Dict. v. 3. Sm. Fl. Brit. 1031. Ait. Hort. Kew. v. 5. 314. Juss. 414. Tourn. t. 355, 356. Lamarck Illustr. t. 786. Michaux Boreal-Amer. v. 2. 204. Pursh North Amer. v. 2. 639. Gærtn. t. 91. (*Abies*; Juss. 414. Tourn. t. 353, 354. Lamarck Illustr. t. 785. Larix; Tourn. t. 357.)—Class and order, *Monocœcia Monadelphia*. Nat. Ord. *Conifera*, Linn. Juss.

Gen. Ch. Male, *Cal.* none, except the spreading scales of the flower-bud. *Cor.* none. *Stam.* Filaments very numerous, collected below into a cylindrical column, racemose above; anthers horizontal, wedge-shaped, opening underneath by two longitudinal cells, and crowned by an ascending membranous crest.

Female, on the same plant. *Cal.* a nearly ovate dense catkin, composed of oblong, closely imbricated, wedge-shaped, rigid, permanent, two-lipped scales. *Cor.* none. *Pist.* Germens two at the base of each scale; style none; stigmas between the lips of the scale. *Peric.* none, except the hardened scales, combining to form a woody permanent cone. *Seeds* two to each scale, each lodged in a little hollow at the base, oval, furnished with a vertical, membranous, unequal-sided wing, usually larger than the seed, but smaller than the corresponding half of the annexed scale.

Eff. Ch. Male, Calyx none. Corolla none. Anthers racemose, crested.

Female, Calyx the scale of a catkin, unequally two-lipped. Corolla none. Cone woody. Seeds two, winged at the base of each scale.

Obs. Linnæus describes as the style and stigma, the awl-shaped point, which terminates one lip of the scales of the female catkin, and, in some species, hardens into a very powerful spine. Jussieu describes in his *Abies*, which includes the larches and spruce firs, two glands like stigmas at the base of one of the scales, or rather, as we understand the flower, one of the lips of each scale. An examination of several species has persuaded us that the impregnation takes place nearly as this great writer's account implies, and possibly, in some measure, as Mr. Salisbury has explained, in Tr. of the Linn. Soc. v. 8. 309; though we suspect some error as to the Larch, and particularly those "long crimson stigmas" of the *P. Cembra*, there described.—The knowledge of the species of this genus, and their

various useful properties, has been greatly augmented by the magnificent and learned monograph of Mr. Lambert, published in 1803. Linnæus has defined but twelve species; Mr. Lambert describes thirty-four, of which thirty are enumerated by Mr. Aiton in the new edition of his *Hortus Kewensis*; Mr. Pursh has nineteen in his *Flora of North America*, just come to our hands. Those which are the produce of that country have received the most complete botanical investigation. The oriental ones are not, as yet, so well understood, nor are they, apparently, by far so numerous.—The younger Michaux in his *Arbres forestiers*, a work in three volumes 8vo., has, it seems, criticised inaccurately much of Mr. Lambert's work, and very unwarrantably changed some of his names. These attacks are repelled by our intelligent friend, in Mr. Pursh's work, published under his inspection. Our sections are those of Mr. Lambert.

SECT. 1. *Leaves several from the same sheathing base.* PINUS of Tournefort. Nineteen species.

1. *P. sylvestris*. Scotch Fir. Linn. Sp. Pl. 1418. Willd. n. 1. Ait. n. 1. Lambert 1. t. 1. Engl. Bot. t. 2460. Mill. Illustr. t. 82. Woodv. Med. Bot. t. 207. Ger. Em. 1356.—Leaves in pairs, rigid. Young cones stalked, recurved. Crest of the anthers very small.—Native of dry stony sandy hills in Scotland, and other northern parts of Europe, flowering in May, and ripening seed two years afterwards. This species lives to the age of 400 years or more, and is lofty and straight in its growth, with oblique branches. The bark scales off in large light cellular flakes. *Sheaths* of the leaves spirally disposed, tubular, membranous, at length rugged, torn at the end. *Leaves* in pairs from each sheath, equal, about two inches long, linear, narrow, obtuse with a small point, minutely serrated, evergreen, smooth; their upper surfaces, which are dark green, and rather concave, originally clasped together, but soon separating; the under convex, more glaucous, striated. *Flowers* terminal, erect; the males aggregate, spiked, sulphur-coloured, soon surmounted by a protruding leafy branch, each flower having several chafly concave scaly bractæ at its base, which some call a four-leaved calyx: females solitary, globular, variegated with purple and green, with several serrated, pointed, scaly bractæ. The year after impregnation, the young fruit becomes lateral, stalked and reflexed, green, of a more ovate figure; and the second year ripens into ovate, pointed, hard, tessellated but unarmed, woody cones, whose dry scales finally gape, and allow of the dispersion of the winged seeds. This is further promoted, in various species, by the attacks of *Loxia*, and such hard-billed birds, who in seeking the seeds for food, split the cone, thus dispersing many more seeds than they devour. The wood of *P. sylvestris* is known by the name of red deal, and its value, as well as that of the tar, pitch, and turpentine, afforded by this species, is well known. The tree is planted on our most barren exposed hills and downs, as a shelter for more tender plantations, and is in itself a profitable object of culture, though not one of the most agreeable ornaments to a country where any thing else will grow. We have observed with regret some noble beech woods in Berkshire, recently bordered with miserable Scotch and spruce firs, which happily indeed soon die in that chalky soil, and the mischief is neither lasting nor extensive.

*P. Mugbus*, Jacq. Ic. Rar. t. 193. Willd. n. 2, is judged by Mr. Lambert to be a variety of *sylvestris*, of a humble spreading growth, caused probably by its lofty station on the alps of Austria; nor is it, as Jacquen thought, the *Mugbus* of Scopoli; see the next species.

2. *P. Punilio*. Mugho, or Mountain Pine-tree. Willd.

n. 3. Ait. n. 2. Scop. Carn. v. 2. 247. Lamb. 5. t. 2. (*Pinaster Pumilio*; Cluf. Pann. 15. *P. quartus austriacus*; Cluf. Hist. v. 1. 32. Ger. Em. 1358.)—Leaves in pairs, short, straight. Cones ovate, obtuse, very small; the younger ones sessile, erect. Crest of the anthers prominent, cloven.—Native of mountains in the south-east parts of Europe, flowering in June. Mr. Blackburne of Orford is recorded as its first cultivator in England. This, the most humble of its genus, is scarcely seven feet high, extending itself by trailing *shoots*, and even by rooting decumbent *branches*. The *leaves* are shorter, and *cones* much smaller than the foregoing, and the much more distinct, prominent, two-lobed, crenate crest of the *anthers*, affords a satisfactory mark of specific distinction.

3. *P. pungens*. Prickly-coned Pine-tree. Lamb. 91. t. 16. f. c, the cone only. Ait. n. 3. Pursh. n. 14. Mich. Arb. For. v. 1. 61. t. 5. Ait.—Leaves in pairs, short, acute. Cones ovate; the prickles of their scales elongated, very sharp, incurved; the lower ones deflexed.—Native of the summits of the blue mountains on the frontiers of Virginia and North Carolina, in large forests, where it was found by W. Strickland, esq. The *leaves* are much broader and shorter than those of *P. Pumilio*, and tipped with a spinous point. *Cones* broad-ovate, light tawny brown, armed with extremely pungent incurved spines.

4. *P. Banksiana*. Labrador Pine-tree. Lamb. 7. t. 3. Ait. n. 4. Willd. n. 10. Pursh n. 10.—Leaves in pairs, divaricated, oblique. Cones recurved, twisted. Crest of the anthers dilated, emarginate.—Native of Nova Scotia, Hudson's Bay, &c. Rarely cultivated in England, flowering in April. This is with us a tall *tree*, with numerous long and spreading *branches*, though more humble on its native rocks. *Leaves* scarcely above an inch long, variously twisted. Crest rather broader than the *anther* itself, kidney-shaped, emarginate and crenate. *Cones* very abundant, oblong, rather slender, rugged, brown, two inches in length, recurved, so that their points touch the branch, and often meet each other. Communicated to Mr. Lambert by sir J. Banks. The finest trees of this species are in the gardens at Pain's-hill and Kew.

5. *P. Pinaster*. Cluster Pine-tree. Ait. H. Kew. ed. 1. v. 3. 367. Lamb. 9. t. 4, 5. Ait. n. 5. Willd. n. 4. (*P. maritima altera*; Matth. Valgr. v. 1. 91. Duham. Arb. v. 2. 125. t. 29.)—Leaves in pairs, elongated. Cones whorled, clustered, ovate, sessile, drooping, with somewhat pointed scales. Crest of the anther rounded.—Native of the south of Europe, in rocky mountainous places, especially near the sea. Common in English plantations, flowering in April and May. Larger in every part than the Scotch fir, forming a stout and lofty *tree*. The *leaves* are four inches long, narrow, pungent, straight. The male *flowers* compose a very handsome golden thyrsus; the crest of their *anthers* is rounded, nearly orbicular, crenate; not *dilated*, as Willdenow has erroneously copied Mr. Lambert, which has caused a similar error in Hort. Kew. Female *flowers* with rich crimson scales. *Cones* ovate, rather pointed, four inches long, bright brown, each scale tipped with a short broad bluntish spine. In the south of France these trees are wastefully cut all down one side, as they stand, in winter, for the turpentine to ooze out. The wood and pitch is much used in Switzerland. The stakes serve to support vines of humble growth.

6. *P. Pinæa*. Stone Pine-tree. Linn. Sp. Pl. 1419. Lamb. 11. t. 6, 7, 8. Willd. n. 11. Ait. n. 6. (*P. domestica*; Matth. Valgr. v. 1. 87. *P. fativa*; Duham. Arb. v. 2. 125. t. 27. Ger. Em. 1355.)—Leaves in pairs. *Cones* ovate, obtuse, as long as the leaves; their scales with

recurved deciduous points. Seeds bony, with very short wings. Crest of the anthers jagged.—Native of the south of Europe and north of Africa. Mr. Hawkins and Dr. Sibthorp observed it in Greece, especially in the sandy plains of Elis, from whence the nuts are exported for eating, and the timber is often used for ship-building. In Italy these nuts generally supply the place of almonds, in various articles of cookery; and that they have done so from remote antiquity, appears from their having been found among the domestic stores in the pantries of Herculaneum and Pompeia. The kernel is sweet, with a turpentine flavour; its shell very hard. This *tree* appears to great advantage in the landscapes and gardens about Rome, as well as occasionally in our English plantations. Its fine dark green *leaves*, copious male *bloffoms* diffusing a shower of sulphureous pollen on all the neighbouring plants, and the maffy *cones*, render it very remarkable.

7. *P. maritima*. Maritime Pine-tree. Lamb. 13. t. 10. Willd. n. 8. Ait. n. 7.—Leaves in pairs, slender, rough-edged. Cones ovate, solitary, drooping, stalked, tessellated, even, close. Crest of the anthers somewhat pointed, undivided.—Native of the sea-coasts of the south of Europe. Micheli sent a specimen to Sherard from Italy, and Dr. Sibthorp gathered the same in Greece, as we learn from his collection of drawings. Miller appears to have cultivated this species, but we feel some slight doubts respecting Mr. Lambert's ninth plate, and his cone from Sion gardens, t. 10. f. f, is surely different. The *cones* of the true *maritima* are peculiar for their even or level surface, the outer part of each scale being flat, with a central scar, which has no point nor prominence; nor do they spread or separate much to discharge the seeds. The male *flowers* are capitate, not spiked; they are shorter and the crest of their *anthers* less orbicular, and more pointed, in Dr. Sibthorp's figure than in Mr. Lambert's t. 9, though both drawings were made by the same excellent artist; and their capitate inflorescence agrees.

8. *P. halepensis*. Aleppo Pine-tree. Lamb. 15. t. 11. Willd. n. 7. Ait. n. 8. Desfont. Atlant. v. 2. 352. Mill. Ic. t. 208. (*P. maritima prima*; Matth. Valgr. v. 1. 90.)—Leaves in pairs, very slender. Cones ovate-oblong, drooping, stalked, tuberculated, polished, unarmed. Crest of the anthers rounded, jagged.—Native of Syria. Observed by Desfontaines also on mount Atlas, and on the uncultivated hills of Barbary, abundantly, as well as in the south of France near Frejus; but this tree does not always bear the winters of Paris nor of London, so that it is very scarce in collections. It differs from the last in having more slender *leaves*; spiked male *flowers*, the crest of whose *anthers* is broader than long, jagged, not pointed; and especially in the ruggedness of its cones, the prominent part of whose scales is tumid, and of a fine polished red-brown. These scales spread widely to discharge the seeds. The synonym of Matthioli is given on the authority of a specimen seen by Mr. Lambert in the Sherardian herbarium; and indeed his cut answers well to our plant, though employed by Duhamel, v. 2. t. 28, for his own *P. maritima major*, instead of his *P. hierosolymitana*, &c. n. 14, to which we presume it belongs.

9. *P. Massoniana*. Indian Pine-tree. Lamb. 17. t. 12. Willd. n. 9.—Leaves in pairs, very long and slender; their sheaths very short. Crest of the anthers short, broad, toothed.—Native of China; from whence its seeds were brought to the Cape of Good Hope, and produced flowering trees there, specimens of which, given to sir J. Banks by Mr. Masson, were examined and delineated for Mr. Lambert's work, nor has this species been elsewhere published.

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lished. The *stipulæ* on the young shoots are finely fringed. *Leaves* four or five inches long, apparently erect. Male *flowers* spiked; the creft of their *anthers* twice as broad as long, sharply toothed. The *cones* have not come to our knowledge.

10. *P. inops*. Jersey Pine-tree. Ait. Hort. Kew. ed. 1. v. 3. 367. Lamb. 18. t. 13. Willd. n. 5. Ait. n. 9. Pursh. n. 8. Michaux Arb. For. v. 1. 58. t. 4.—Leaves in pairs. Cones drooping, oblong-conical, longer than the leaves; their scales with awl-shaped prominent spines. Crest of the anthers short, broad, jagged.—Native of dry barren hills, in the interior parts of North America, from New Jersey to Carolina, where it blossoms in May. Mr. Pursh says it is of a middle size, straggling growth, and full of resin, the branches tougher than any other pine with which he is acquainted. It might serve for several useful purposes, if the wood were not so liable to early decay. This account agrees with Mr. Lambert's, which M. Michaux has controverted. Kalm has remarked that cattle in hot weather studiously shun this tree for shade in preference to all others. Its effluvia are supposed to be agreeable to them; or rather perhaps hostile to some insects which persecute them, such as gad-flies, to whose approach all cattle are extremely sensible. See Linn. Tour in Lapland, v. 1. 205. The *leaves* of *P. inops* are of a dark green, two inches long, less slender than in *maritima* or *halapensis*, the aspect of the tree being most like a starved Scotch Fir. The scales of the female *catkin* are reddish, with long taper points, that harden into pungent, prominent, slightly curved spines on the ripe *cones*.

11. *P. resinosa*. American Pitch Pine-tree. Red Pine. Ait. H. Kew. ed. 1. v. 3. 367. Lamb. 20. t. 14. Willd. n. 6. Ait. n. 10. Pursh n. 9. (*P. rubra*; Michaux Arb. For. v. 1. 45. t. 1.)—Leaves in pairs, elongated, with long sheaths. Cones ovate, sessile, nearly solitary, tolerably even, unarmed, not half the length of the leaves. Crest short, jagged, narrower than the anther.—Native of Canada and the western parts of New York. *Pursh*. It was first raised in England by the late duke of Northumberland, at Sion House, where many of this species are still to be seen, flowering in May. This tree requires, according to Mr. Lambert, a moist situation, and light sandy soil, and though rare in England, is well worthy of cultivation, being of elegant appearance, and remarkable for the fragrance and abundance of its resin. The *leaves* are four inches long, roughish at the point, spreading, with sheaths a quarter of their length. Male *flowers* spiked, copious, handsome, the crefts of their *anthers* purple. Female *flowers* oval, deep purple, their scales broad, the larger lip only very slightly pointed. *Cones* usually two or three together, sessile, spreading, scarcely half the length of the leaves, ovate, obtuse, their scales a little tumid, but quite destitute of spines or points. In close forests, Mr. Pursh says, this species grows very tall, with a remarkably smooth red bark. The timber is very heavy, and therefore unfit for masts.

12. *P. variabilis*. Two and three-leaved Pine-tree. Yellow Pine. Lamb. 22. t. 15. Willd. n. 12. Ait. n. 11. Pursh n. 11. (*P. mitis*; Michaux Arb. For. v. 1. 52. t. 3.)—Leaves two or three together, channelled with short sheaths. Cones oblong-ovate, nearly solitary, stalked, drooping; their scales with short inflexed spines. Found in moist pine forests, from New England to Georgia. *Pursh*. Mr. Lambert has seen but two trees of this kind in England, one at Pain's hill, the other at Kew; nor has he delineated the male flowers. This author speaks of the wood as too spongy and light to be durable; but Mr. Pursh says "the yellow pine is the most in use for building of houses as well as ship-

ping." The diversity of number among the *leaves* on the same branch is peculiar. Their length, almost two inches, rather exceeds that of the *cones*. Their *sheaths* are short.

13. *P. Teda*. Frankincense Pine-tree. Linn. Sp. Pl. 1419. Willd. n. 14. Ait. n. 13. Pursh n. 15.—Leaves three together, elongated, with long sheaths. Cones ovate-oblong, deflexed; their scales with inflexed spines. Crests of the anthers imbricated, orbicular.—Native of barren sandy situations, from Virginia to Florida. Mr. Pursh says this, which he terms the Loblolly, or Old-field Pine, "is found in large tracts in the southern states. All the woods seem to be feeded with it; for when any piece of cleared land is neglected, for any space of time, it will be covered with those pines. It is difficult, and in some cases almost impracticable, to recover those lands run over with young pines, as the ground appears to have lost all fertile properties for any other vegetable than those trees." The *leaves* are three from each sheath, larger, and their *sheaths* longer, than even in *P. resinosa*. Male *flowers* capitate, of a glowing yellow, the crefts of their *anthers* orbicular and crowded, or imbricated, over each other. The length of the *leaves* is about six inches; that of the *cones* about three. Their *spines* are very sharp, broad at the base, short, all inflexed. *Fig. c* of Mr. Lambert's t. 16, we have already cited as another species; see *pungens*, n. 3. His reference to Wangenheim, and the observations borrowed from that author, are also misplaced here, belonging rather to *rigida* or *serotina*, in Mr. Pursh's opinion. *P. Teda* flowers in America about April or May. It would be well worthy of cultivation in England, on barren sandy heaths, where nothing else of value will thrive; but though it has been known above a century in our gardens, nobody seems to have taken up this species as an object of ornament or economy.

14. *P. rigida*. Three-leaved Virginian Pine-tree. Common American black, or pitch, pine. Mill. Dict. ed. 8. n. 10. Lamb. 25. t. 18, 19. Willd. n. 13. Ait. n. 13. Pursh n. 12. Michaux Arb. For. v. 1. 89. t. 8.—Leaves three together, elongated, with shortish sheaths. Cones clustered, ovate; their scales with reflexed spines. Crest of the anthers rounded, jagged. Found in the plains, from New England to Virginia, either in dry, or wet low situations, blossoming in May. *Pursh*. It often grows to a large size. The numerous clustered *cones* afford a striking character at first sight. The *leaves* are about three or four inches long, rough at the points; their *sheaths* of a much shorter proportion than those of *P. Teda*. The spines of the *cones* being reflexed, not inflexed, will, at any time, distinguish them. The wood is not excellent.—*P. serotina*; Mich. Boreal-Amer. v. 2. 205. Mich. Arb. For. v. 1. 86. t. 7. Willd. n. 16. Pursh n. 13, of which a cone is given in Lambert's t. 19. f. 5; *P. Teda* ♂; Ait. H. Kew. ed. 1; the  $\beta$  of the 2d edition; appears, by Mr. Pursh's account, to be but a variety of the *rigida*, growing on the edges of ponds and swamps.

15. *P. palustris*. Swamp Pine-tree. Long-leaved, or Broom Pine. Mill. Dict. ed. 8. n. 14. Lamb. 27. t. 20. Willd. n. 15. Ait. n. 14. Pursh n. 16. Sm. Abb. Inf. v. 1. 83. t. 42. (*P. australis*; Mich. Arb. For. v. 1. 64. t. 6.)—Leaves three together, very long, drooping, with long sheaths. *Stipulas* pinnatifid, reflexed, permanent. Cones somewhat cylindrical, prickly.—Native of forests near the sea coast, from North Carolina to Florida. *Pursh*. Seldom seen in our gardens, except of a very small size, being tender. A tree at Kew, with its copious drooping *leaves*, 12 or 15 inches long, makes a beautiful appearance. The male *flowers*, which Mr. Lambert was obliged to have drawn from a dried American specimen, are capitate, very long,

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long, with imbricated orbicular tawny crests to the *anthers*. *Cone* 10 or 12 inches long, each scale tipped with a small, prominent, rather incurved, spine. The points of the *leaves* are finely serrated; their *sheaths* long, splitting at the top into linear, recurved, jagged segments. *Stipulas* at the base of the sheaths, and not half so long, linear, recurved, acute, torn in a pinnatifid manner.

16. *P. longifolia*. Long-leaved Pine-tree. Lamb. 29. t. 21. Willd. n. 17. Ait. n. 15.—Leaves three together, very long and slender, drooping, finely serrated, with long sheaths. *Stipulas* entire, deciduous. *Cones* ovate, with prominent, angular, recurved, minutely-spinous scales.—Native of the lofty mountains of Nepaul, in the East Indies, where, according to Dr. Roxburgh, this *tree* grows to the height of 100 feet, blossoming about the beginning of the hot season. It is marked as a green-house plant in Hort. Kew. and said to have been introduced by Messrs. Gray and Wear, in 1801. Nothing can be more beautiful than the copious tuft of slender, pendulous, rough-edged *leaves*, near 18 inches long, as exhibited in Mr. Lambert's beautiful plate. The male *flowers* are rather capitate than spiked. *Cones* (of which a solitary perfect specimen is given in a second impression of that plate, instead of two which prove to belong to a different and undescribed species, see p. 91.) ovate, four inches long, distinguished by the unusually prominent recurved points of their *scales*. The head of this lofty *tree* is said to be round and small, affording little shade.

17. *P. Strobus*. Weymouth Pine-tree. Linn. Sp. Pl. 1419. Willd. n. 20. Ait. n. 16. Pursh n. 17. Lamb. 31. t. 22. (*P. americana*, *quinis ex uno folliculo fetis*, &c.; Hort. Angl. 57. t. 17. f. 1.)—Leaves five together. *Cones* cylindrical, imbricated, smooth, longer than the leaves. Crest of the anthers of two minute awl-shaped bristles. Found on the sides of hills, in a fertile soil, from Canada to Virginia, flowering in May. It is the largest and most useful of all the American Pines, and the best timber for masts, growing, in the state of Vermont, to an enormous size. *Pursh*. The attention which lord Weymouth, afterwards marquis of Bath, gave to the cultivation of this valuable tree, has justly stamped it with his name. It is now generally diffused through every considerable plantation. Its timber is excellent. The *leaves* are very slender, and differ from all the preceding in growing five from each sheath. In winter they approach the branch in an erect posture; in summer they spread widely. The male *flowers* are distinguished by the peculiar crest of their *anthers*. The long, taper, smooth, deflexed *cones*, with broad flat scales, are very peculiar, and, in a green unripe state, singularly elegant.

18. *P. Cembra*. Siberian Stone Pine-tree. Linn. Sp. Pl. 1419. Willd. n. 18. Ait. n. 17. Lamb. 34. t. 23, 24. Pall. Ross. v. 1. 3. t. 2. (*P. maritima altera*; Matth. Valgr. v. 1. 93. P. n° 30; Gmel. Sib. v. 1. 179. t. 39. P. n. 20; Duham. Arb. v. 2. 127. t. 32. *P. sylvestris*, *cembra*; Camer. Epit. 42.)—Leaves five together. *Cones* ovate, imbricated. Wing of the seeds obliterated. Crest of the anther kidney shaped, crenate. Native of the alps of Siberia, Tartary, Switzerland, Italy, &c. In Switzerland it is known by the name of *Aphernoussi*. Mr. Aiton records it to have been cultivated in 1746, by Archibald, duke of Argyle. Being of extremely slow growth, only very small plants of this species are usually seen in collections. The finest we have observed were at Mill Hill; but after the deplorable havoc made there by ignorant or negligent possessors, we know not whether these trees still exist. (See COLLINSON.) They were supposed

to be sixty or seventy years old in 1802, when we saw them in fine flower and fruit, being then but just arrived at the vigour of their growth, and by no means at full maturity. The aspect of the *tree* is not very handsome. The *leaves* are of a dull hue, fine and slender like the Weymouth pine, with which they agree in number. Male *flowers* copious, capitate; the *anthers* and their rounded crests tipped with purple. *Cones* ovate, thick, two inches or more in length, purplish, with a plum-like bloom; their scales thick, obtuse, with a somewhat corky surface. *Seeds*, which we have never seen perfected in England, almost destitute of a wing, obovate, resembling those of *P. Pinea*, like which they are eatable; but their shell is more easily broken.

19. *P. occidentalis*. West Indian Pine-tree. Swartz Ind. Occ. v. 2. 1230. Lamb. 36. Willd. n. 19. (*P. foliis quinis ab eodem exortu*; Plum. Ic. 154. t. 161.)—Leaves five together, rough-edged, very long. *Cones* ovate, tessellated, shorter than the leaves; their scales minutely spinous. Wing longer than the seed.—Native of the mountains of Hispaniola, according to Dr. Swartz, who never saw more than one tree of this species, and a nearly destroyed *cone*. He describes it as fifty feet or more in height, with upright uneven rugged *branches*. *Leaves* crowded about the extremities of the branches, five from each sheath, a span long, linear-awl-shaped, triangular, with rough, or finely serrated, edges. *Cones* three inches long, deflexed. Plumier's figure agrees with this account, but it very distinctly shews the cone to be not, as Swartz subsequently says, imbricated, but tessellated like most of the first-described species, each scale having an abrupt angular termination; whereas in *P. Strobus* and *Cembra*, the only two species besides that have five leaves from one sheath, the scales of the *cones* are truly imbricated over each other. The *seeds* moreover being, as far as we can judge from Plumier's plate, considerably winged, differ widely from those of *Cembra*; as the whole *cone* does from that of *Strobus*, to which latter species Burmann, the editor of Plumier, most incautiously referred his plant.

SECT. 2. *Leaves solitary, scattered*. ABIES of Tournefort. Eleven species.

20. *P. Abies*. Norway Spruce Fir. Linn. Sp. Pl. 1421. Willd. n. 32. Ait. n. 18. Lamb. 37. t. 25. Fl. Dan. t. 193. Woodv. Med. Bot. t. 208. (*Picea*; Matth. Valgr. v. 1. 88. Camer. Epit. 47. *P. major*; Ger. Em. 1354.)—Leaves solitary, quadrangular. *Cones* cylindrical; their scales rhomboid, flattened, waved and notched. Common filament shorter than the bractæas.—Native of mountains in various parts of Europe, as well as the north of Asia, in places watered by alpine rills, where it grows to a lofty height, and makes a magnificent appearance. Though not a native of this island, few trees have been more generally or longer cultivated here; its stately though formal growth, and especially the fine colour of its ever-green leaves, rendering it very ornamental. The wood is also one of the most valuable sorts of deal, and the forests of Norway afford it abundantly. Mr. Lambert however informs us, that what is grown in England is most durable, and particularly esteemed for making ladders. Burgundy pitch is prepared from this species. The height of the tree is from 100 to 150 feet. It flowers in April. The long sweeping fan-like branches, often broken down by loads of snow, and the effect of boisterous winds, have a grand effect in alpine landscapes, and have been well employed in the sublime compositions of Salvator Rosa, and the German engravers. The *leaves* are copiously scattered all round the branches, ascending, somewhat imbricated, each scarcely an

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an inch long, on a short stalk, smooth, linear, curved, bluntish, with four rather unequal angles, and as many intermediate hollows. *Stipulas* none. *Flowers* terminal; the males most plentiful, of a tawny red; their *bractæas* numerous, spreading, longer than the common filament or basis of the *filaments*; anthers yellow, their crest crimson, roundish kidney-shaped, deeply and acutely jagged. Female *catkins* sessile, oblong, erect, of a rich crimson. *Cones* pendulous, solitary at the end of each branch, a span long, nearly cylindrical, light brown, smooth, of numerous, imbricated, flattish, rigid, rhomboid scales, waved at the edge, and notched at the point. *Seeds* small, with large elliptic-oblong wings.

21. *P. alba*. White Spruce Fir. Ait. H. Kew. ed. 1. v. 3. 371. Lamb. 39. t. 26. Willd. n. 34. Ait. n. 19. Pursh n. 7. (*Abies alba*; Mich. Arb. For. v. 1. 133. t. 12. *A. picæ foliis brevioribus, conis parvis biuncialibus laxis*; Hort. Angl. 2. t. 1. f. 3.)—Leaves solitary, quadrangular, incurved. *Cones* nearly cylindrical; their scales obovate, wavy, entire. Common filament drooping, twice as long as the *bractæas*.—Native of high mountainous tracts in the colder parts of North America, flowering in May. Cultivated in England by bishop Compton before 1700. *Miller*. It vies with the last in general form, but not in loftiness, but the *leaves* are rather smaller, more swelling upwards, and more incurved, with a glaucous hue, and the *bark* of the trunk is whiter. The *flowers* are all smaller; the males distinguished by the great length of their common filament, which is quite pendulous. The *cones* are not above two inches long, their scales obovate, not rhomboid. Mr. Lambert strongly recommends the planting of this tree, on a large scale, on mountainous barren heaths in England and Ireland. Mr. Pursh however says its wood is not so good as that of the following, nor the tree so lofty; neither are its branches fit for making spruce beer.

22. *P. nigra*. Black Spruce Fir. Ait. Hort. Kew. ed. 1. v. 3. 370. Lamb. 41. t. 27. Willd. n. 31. Ait. n. 20. Pursh n. 5. (*Abies nigra*; Mich. Arb. For. v. 1. 123. t. 11. *A. picæ foliis brevioribus glaucis, conis biuncialibus laxis*; Mill. Ic. t. 1.)—Leaves solitary, quadrangular, straight. *Cones* ovate; their scales elliptical, notched at the end. Common filament erect, the length of the *bractæas*.—Native of the tracts of high mountains, from the more northern parts of Canada to Carolina, flowering in May. *Pursh*. It was introduced into England at the same time as the last, but is not much cultivated here. The wood is said by Mr. Pursh to be better than the White Spruce, and the young branches are used for making the well-known spruce beer. The *leaves* and *flowers* are somewhat smaller than the last; the males erect, orange-coloured, their common filament no longer than the erect *bractæas*, the crest of their *anthers* rounded, finely fringed. The *cones* are ovate, hardly above an inch long, crowded about the sides of the last-year's shoots, which have protruded beyond them, and before they become dry, are of a rich deep purple.

23. *P. rubra*. Red Spruce Fir. Lamb. 43. t. 28. Willd. n. 33. Ait. n. 21. Pursh n. 6.—Leaves solitary, awl-shaped. *Cones* oblong, obtuse; their scales rounded, somewhat cloven, the margin entire. Common filament shorter than the *bractæas*.—Found in Nova Scotia, and about Hudson's Bay, flowering in May. Though *Miller* appears to have known this tree in cultivation, it is at present rarely seen, nor does it excite attention, except from the more curious observers. It is of more humble growth than the *nigra*, which it most resembles, except that the *leaves* are awl-shaped; the unripe *cones* of a pale purplish-green, and

when ripe rather oblong than ovate, their scales rounded, and not notched, but split. The shoots are said to make spruce beer.

24. *P. orientalis*. Oriental Fir. Linn. Sp. Pl. 1421. Willd. n. 35. Lamb. 45. t. 29. (*Abies orientalis, folio brevi et tetragono, fructu minimo deorsum inflexo*; Tourn. Cor. 41. Voy. v. 2. 104. letter 17.)—Leaves solitary, quadrangular. *Cones* ovate-cylindrical, pendulous; their scales somewhat rhomboid.—Gathered by Tournefort, on lofty mountains above the convent of St. John, 25 miles south-east of Trebifonde. The modern Greeks know this tree by the name of ελάτη, and it seems to be the only species of the spruce tribe that Tournefort found in the Levant. We know it merely from Mr. Lambert's plate, in which a copy of Aubriet's sketch of an original specimen, bearing two cones, is given; along with a coloured representation of two other cones, from China, judged by Mr. Lambert to belong to the same species. The *leaves* of Tournefort's plant are very short, being hardly half an inch long, somewhat incurved. *Cones* two inches long, stalked, quite pendulous, ovate and tapering, with rounded, entire, even scales; those of the Chinese plant are more sessile, with more rhomboid wavy scales.

25. *P. Picca*. Silver Fir. Linn. Sp. Pl. 1420. Willd. n. 26. Ait. n. 22. Lamb. 46. t. 30. Woodv. Med. Bot. t. 209. (*Abies mas*; Ger. Em. 1363, 1364.)—Leaves solitary, flat, somewhat two-ranked. *Cones* cylindrical, erect, with long-pointed scales. Crest of the anthers with two horns.—Native of the mountains of Siberia, Germany, and Switzerland; but not of Scotland, as Linnæus and Willdenow state; nor of Sweden, as the latter erroneously borrows from the former, printing *Suscia* for *Suevia*. A tall and handsome tree, cultivated for ornament in England, and flowering in May. Its *bark* is smooth and whitish. *Branches* horizontal. *Leaves* copious, linear, either acute or emarginate, entire, spreading, more or less perfectly, in two ranks, and sometimes curved toward one side; their upper surface of a dark, shining, rather glaucous, green; the under glaucous-white. Male *flowers* numerous, axillary, solitary, about as long as the *leaves*, yellow; their common filament the length of the toothed *bractæas*; *anthers* remarkable for their rounded two-lobed crest, crowned with a pair of divaricated horns. Female *catkins* lateral, erect, cylindrical, green, one lip of each scale, much the narrowest, distinguished by a long, projecting, awl-shaped point, very conspicuous in the full-grown *cones*, which are also erect, three or four inches long, cylindrical, of a reddish-green, till they turn brown in drying. *Gmelin* asserts that forests of this tree are considered, by the wandering Tartars, as a sure indication of good springs, as it delights in moist rich situations; an obstacle to its being planted much for profit in England.

26. *P. Balsamea*. Balm of Gilead Fir. Linn. Sp. Pl. 1421. Willd. n. 27. Ait. n. 319. Pursh n. 1. Lamb. 48. t. 31. (*Abies balsamifera*; Mich. Boreal-Amer. v. 2. 207. Mich. Arb. For. v. 1. 145. t. 14.)—Leaves solitary, flat, imperfectly two-ranked. *Cones* cylindrical, erect, with short-pointed scales. Crest of the anthers pointless.—Native of Canada, Nova Scotia, New England, and the Alleghany mountains, in high cold situations, flowering in May. *Pursh*. It has long been cultivated for curiosity in England, but in general, though it grows to a considerable size and height, scarcely survives above 20 years, which seems to be the natural period of its existence. In this respect our observations agree with those of *Miller* and Mr. Lambert; though the latter has been told of some older trees of this species at Wooburn and Warwick-castle. Its fragrant ex-

udation is the well-known Canada balsam, which some quacks celebrate as Balm of Gilead, to their own profit, if not to that of their patients. Combined with some kind of spirits, it makes a not unpleasent dram. This tree and its foliage are not much unlike the last, but the above characters clearly distinguish it. The full-grown *cones* are of a beautiful violet hue, and exude plenty of candied turpentine or balsam, as does the trunk when wounded.

27. *P. Frazeri*. Double-balsam Fir. Pursh n. 2.—Leaves solitary, flat, emarginate. Cones ovate-oblong, erect, their scales elongated, reflexed, oblong-wedged-shaped, emarginate, short-pointed, toothed. Found on the high mountains of Carolina, by the late Mr. Frazer, by whom it has been introduced into England. Mr. Pursh, who met with the same species on the Broad-mountains, Pennsylvania, describes it as a smaller tree than the last, with shorter more erect *leaves*, and *cones* not one-fourth so large.

28. *P. taxifolia*. Nootka Fir. Lamb. 51. t. 33. Willd. n. 29. Pursh n. 3.—Leaves solitary, flat, entire. Cones oblong. Anthers of two inflated lobes; their crest minute, reflexed; common filament shorter than the concave fringed bractæas.—Gathered by Mr. Menzies at Nootka found; “by Mr. Lewis on the banks of the Columbia.” *Pursh*. A tall elegant tree, bearing some resemblance to the following, but the *leaves* are more than twice as long, and entire. The *anthers* too, as far as they could be made out from a dried specimen, appear very different; and the *cones* are said by Mr. Menzies to be longer, as well as differently shaped.

29. *P. canadensis*. Hemlock Spruce Fir. Linn. Sp. Pl. 1421. Willd. n. 30. Ait. n. 24. Pursh n. 4. Lamb. 50. t. 32. (*Abies canadensis*; Mich. Boreal-Amer. v. 2. 206. Mich. Arb. For. v. 1. 137. t. 13.)—Leaves solitary, flat, two-ranked, finely toothed. Cones terminal, ovate, scarcely longer than the leaves. Anthers capitate, beaked; common filament twice as long as the bractæas.—“Native of the most northern regions of Canada, and on the highest mountains, as far as South Carolina, flowering in May. A very elegant tree, growing in some situations to an enormous size; its bark is a fine substitute for oak-bark in tanning.” *Pursh*. Peter Collinson records his having introduced this tree, in 1736, to the English collections, and a fine specimen of it is, or was, in his garden at Mill Hill. The aspect of the Hemlock Spruce is rather gloomy, partaking more of the yew than of the fir. The male *flowers* are small, consisting of very few *anthers*, in a round head on a long common filament. The *cones* are scarcely an inch long, smooth, pale, of but few scales, and hang solitary at the ends of the small ultimate branches. The *leaves* are glaucous underneath in this, as well as in four species immediately preceding.

30. *P. lanceolata*. Lance-leaved Chinese Pine-tree. Lamb. 52. t. 34. Willd. n. 28. Ait. n. 25.—Leaves solitary, lanceolate, flat, spreading, with taper pungent points. Cones globose, with pointed scales.—Gathered by the late sir G. L. Staunton, bart. in the province of Chekiang, China, from whose specimen Mr. Lambert at first published an uncoloured figure. A coloured drawing, with a dissection of the *cone*, displaying the *seeds*, each of which is represented as encompassed with an oval wing, was subsequently sent from Canton by an artist in the employment of the East India Company; by all which Mr. Lambert has profited. Living plants have also been brought to Kew in 1804, and are now cultivated in the green-houses of that and some other choice collections, but have not yet blossomed. The aspect of this *tree* or *shrub*, for we know nothing of its natural stature, is so unlike all

other pines or firs, that its unripe *cones* were actually supposed to be excrescences, or galls, owing to the attacks of insects. The copious, deflexed, rigid, pungent *leaves*, near an inch and a half long, of a fine green, spread in every direction; they are entire, but rough-edged, and furnished with three ribs. *Cones* about as big as wall-nuts, sessile, rather drooping, almost globular, of many ovate pointed scales.

SECT. 3. *Leaves numerously tufted from each sheath.* LARIX of Tournefort. Four species.

31. *P. Larix*. Common, or White, Larch-tree. Linn. Sp. Pl. 1420. Willd. n. 24. Ait. n. 26. Lamb. 53. t. 35. Woodv. Med. Bot. t. 210. (*Larix*; Matth. Valgr. v. 1. 95. Ger. Em. 1365. Camer. Epit. 45, 46.)—Leaves tufted, deciduous. Cones ovate-oblong; the margins of their scales reflexed, jagged. Scales of the female catkin fiddle-shaped, prominent in the full-grown cone. Native of the alps of Switzerland, Italy, Germany, Siberia, &c., long cultivated very extensively, and with great advantage in this country, flowering in March and April, before the leaves fully expand, in which state it makes an elegant appearance. Mr. Lambert's plates of this and the following are no less beautiful pictures, than exquisitely faithful botanical drawings. The same may indeed be said of his whole work. The larch is a tree of straight and lofty growth, as well as large bulk, with wide-spreading *branches*, whose extremities droop in the most graceful manner. In a wild state its form is, of course, less regular, but more picturesque. The *buds* are alternate, perennial, cup-shaped, scaly, each producing annually a pencil-like tuft of very numerous, spreading, linear, bluntish, entire, smooth, tender, bright-green, deciduous *leaves*, about an inch long, with no other *stipulas* than the scales of the bud. How many years each bud endures, we have not determined, but certainly above four or five. From similar buds spring separately, on the same branch, the male and female *flowers*, the latter only accompanied by a few leaves; but it seems to us, that the male buds become entirely leaf-buds, in the succeeding seasons. *Bractæas* to each flower numerous, recurved, obtuse, with fine fringe-like teeth, chaffy, red-brown, deciduous. Male *flowers* yellow, drooping, about half an inch long. Common *filament* much shorter than the *bractæas*; *anthers* crowded, deflexed, inflated, and two-lobed in front, with a short recurved point. Female *catkins* erect, larger than the male *flowers*, beautifully variegated with green and pink; one lip of each scale orbicular; the other much larger, fiddle-shaped, reflexed, with a prominent, awl-shaped, green point. This lip becomes erect, and somewhat enlarged, projecting always beyond the orbicular one, which dilates greatly, hardens, and becomes the seed-bearing scale of the *cone*. The *cones* are erect, rather above an inch long, ovate; purple when young; reddish-brown when ripe, light, not ponderous. their scales spreading, orbicular, slightly reflexed, and jagged, or cracked, at the margin. Wing of each *seed* half-ovate.

32. *P. pendula*. Black Larch-tree. Tamarack or Hackmatack of the Americans. Ait. Hort. Kew. ed. 1. v. 3. 369. Lamb. 56. t. 36. Willd. n. 22. Ait. n. 27. Pursh n. 18.—Leaves tufted, deciduous. Cones oblong; the margins of their scales inflexed. Scales of the female catkin fiddle-shaped, concealed in the full-grown cone.—Found in low cedar swamps, from Canada to New Jersey, flowering in April and May. *Pursh*. It was first raised in England by the celebrated P. Collinson, whose original tree, one of the treasures of the Mill Hill garden, was cut down about the year 1800, to make a rail, by its sapient possessor. The abundance of seeds, which it annually produced, might

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have been a far more lasting source of profit, as few exotic trees are more worthy of general cultivation. The wood is at least equal to the European larch, and the bark excellent for tanning. The habit and *foliage* resemble the preceding, but the female *catkins* are represented by Mr. Lambert of a more crimson hue. The fiddle-shaped pointed lip of each of their scales is four or five times as big as the orbicular one, but never increases after the flowering period; so that it becomes entirely concealed, in the full-grown *cones*, by the enlarged orbicular lips, that constitute the proper scales of the *cones*, and twice exceed it in length. This circumstance did not escape the excellent Solander, who first described the present species, from Mr. Collinson's garden. The *fructification* for the most part agrees with *P. Larix*, inasmuch that it is difficult to find specific distinctions. The *cones* however are smaller, more cylindrical, with rather fewer *scales*, whose edges are slightly inflexed, and this, added to the want of the pointed prominences seen in the foregoing, give the full-grown dark purple *cones* a peculiar neatness and smoothness of appearance.

33. *P. microcarpa*. Red Larch-tree. Lamb. 58. t. 37. Willd. n. 23. Ait. n. 28. Pursh n. 19. (*P. pendula*; Willd. Baumz. 215. *Larix americana*; Mich. Boreal. Amer. v. 2. 203. Mich. Arb. For. v. 3. 37. t. 4.)—Leaves tufted, deciduous. Cones roundish, of few scales; their margins inflexed. Scales of the female catkin oval, concealed in the full-grown cone.—Found about Hudson's Bay, and on high mountains of New York and Pennsylvania, flowering in May. Pursh. Michaux, it seems, has confounded this with the last, as did Willdenow in his valuable German work on hardy trees and shrubs, published at Berlin in 1796. This is similar to *P. pendula* in general appearance, but the *leaves* are rather smaller, and the *cones* considerably so, being rounder and composed of much fewer scales. The male *flowers* are more short and tufted, their *anthers* scarcely projecting beyond the *bractæas*. The pointed lip of each scale of the female *catkin* affords the most clear distinction, being elliptical, not fiddle-shaped. The copious crimson *cones*, fully grown but not ripe, make a beautiful appearance in summer. Such was the state of the tree of this species, which Mr. Lambert, in company with the writer of the present article, found unprotected in the middle of a pasture at Whitton, near Hounslow, where it had been planted by John duke of Argyle. It had however escaped injury, and was immediately secured from further danger. Both these American Larches are now in cultivation amongst the nurserymen, and deserve the attention of planters.

34. *P. Cedrus*. Cedar of Lebanon. Linn. Sp. Pl. 1420. Willd. n. 21. Ait. n. 29. Lamb. 59. t. 37. bis. (*Larix orientalis*, fructu rotundiore obtuso; Tourn. Inst. 586. Duham. Arb. v. 1. 332. t. 132. *Cedrus*; Trew Ehret. 1, 28. t. 1, 60, 61. Camer. Epit. 57. C. Libani; Ger. En. 1352. Matth. Valgr. v. 1. 114.)—Leaves tufted, perennial. Cones ovate, abrupt; their scales close-pressed. Crest of the anthers ovate, flat, erect.—Native of mountains in the Levant, especially of the famous Lebanon, from whence seeds were obtained, and plants raised in the English gardens, towards the latter part of the seventeenth century. Two of the oldest of these venerable guests remain at Chelsea, and others of somewhat younger growth at Chiswick, Whitton, Pain's hill, &c. A very large one at Hillingdon was blown down above twenty years ago. The wide-spreading fan-like branches, and perennial *leaves* of this species, differ widely from the three foregoing. Its male *flowers* are extremely different, both in their long cylindrical form, and the erect ovate red crest of their *anthers*,

more agreeing with some of our first-described kinds. The female *catkins* are ovate, dull-purple; both lips of their scales nearly orbicular, and close-pressed. The larger has at its base, on each side, attached to the rudiments of the *seeds*, a pair of combined awl-shaped processes, that might be taken for *styles* or *stigmas*, could any analogous parts be found in other species of *Pinus*. These are, for the first time we believe, represented in a fine plate by Mr. Sowerby, added to Mr. Lambert's work after its original publication. Which of these lips changes into each hardened dilated abrupt scale, of the large ponderous *cones*, we have not had an opportunity of observing. Something similar to the above style-like processes of the Cedar, is shewn in Mr. Lambert's plate of *P. pendula*, at the dissected *scales* of the full-ripe *cones*; where however it has all the appearance either of pubescence, or of lacerated fibres.

SECT. 4. *Leaves opposite*. AGATHIS. Salis. Tr. of Linn. Soc. v. 8. 311. t. 15. One species.

35. *P. Dammara*. Amboina Pitch Pine-tree. Lamb. 61. t. 38. Willd. n. 25. Ait. n. 30. (*Dammara alba*; Rumph. Amb. v. 2. 174. t. 57.)—Leaves opposite, elliptic-lanceolate, striated.—Native of Amboina, where a fine inflammable resin exudes from the trunk when wounded, and is collected for some purpose, not clearly explained by authors. A kind of pitch is also said to be made from this tree, much used in the East Indies. Of its botanical history we know little. The elliptic-lanceolate, thick, rigid, opposite *leaves*, near three inches long and one broad, are widely different from every known *Pinus*, and there is every reason to suppose the *Dammara* constitutes a distinct and dioecious genus; though all that has as yet been explained relative to its fructification is little more than conjecture. The ripe *cones* are globular, close, hard, and woody, as big as a small orange, with tumid, tessellated, unarmed *scales*. Other cones bear something like *anthers* at the base of each scale. Living plants of *P. Dammara* were procured by sir J. Banks for Kew garden in 1804, and are kept in the stove.

PINUS, in *Gardening*, contains plants of the evergreen and deciduous tree kinds, of which the species cultivated are; the wild pine-tree (*P. sylvestris*); the pinaster, or cluster pine-tree (*P. pinaster*); the Jersey pine-tree (*P. inops*); the American pitch pine-tree (*P. resinosa*); the Aleppo pine-tree (*P. halepensis*); the stone pine-tree (*P. pinea*); the torch pine-tree, or three-leaved Virginia pine (*P. tæda*); the swamp pine-tree (*P. palustris*); the Siberian stone pine-tree (*P. cembra*); and the West Indian pine-tree (*P. occidentalis*); the Weymouth pine-tree (*P. strobus*); the cedar of Lebanon (*P. cedrus*); the black larch-tree (*P. pendula*); the common white larch-tree (*P. larix*); the silver fir-tree (*P. picea*); the balm of Gilead fir-tree (*P. balsamea*); the hemlock spruce fir-tree (*P. canadensis*); the black spruce fir-tree (*P. nigra*); the Norway spruce fir-tree (*P. abies*); the white spruce fir-tree (*P. alba*); and the oriental fir-tree (*P. orientalis*).

The trunks of the first sort of these afford masts to our navy, and from them and the branches tar and pitch are obtained, as also by incision, barras, Burgundy pitch, and turpentine.

There are several varieties; as the Tartarian, which has a great resemblance to it, but the leaves are broader, shorter, and their points are more obtuse; they emit a strong balsamic odour when bruised; the cones are very small, as are also the seeds, some of which are black, and others white.

The mountain, or mugho, which has very narrow green leaves, grows sometimes by pairs, sometimes by threes from the same sheath, generally standing erect; the cones are of a middling size, and pyramidal; the scales flat, having each

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a small obtuse rising, but very compact till they are opened by the warmth of the sun the second spring; the seeds of this are much less than those of the second sort, but larger than those of the first. It is a native of the Swiss mountains, where it is often called torch pine, growing to a great height.

The sea pine, which has smooth leaves; the cones are very long and slender; and the seeds are about the same size with those of the second species. It grows in the maritime parts of Italy, &c.

Other varieties are likewise mentioned by writers.

Of the seventh sort there are different varieties; as the three-leaved Virginia, which has the leaves long, generally three in each sheath; the cones in clusters round the branches, as long as those of the second sort, but with rigid scales; the seeds also nearly as large as those of it. It grows naturally in Virginia, and other parts of North America, where it rises to a great height.

The other varieties differ but little from this.

The twelfth sort, or cedar, is now so far naturalized to our country as to produce ripe seeds; we may, therefore, have supplies without depending on the cones from the Levant: but it is found that they are more apt to produce and ripen their cones in hard winters than in mild ones; which is a plain indication that they will succeed even in the coldest seasons of the northern parts of the island, where, as well as in the other parts, they might be propagated to great advantage.

There are different varieties of the fourteenth sort; the American, the Siberian, and the Chinese, require a colder climate than England, for the trees are apt to die in the summer here, especially if they are planted on a dry soil; the cones of those which have been brought to England seem to be in general larger than those of the common sort; but there is so little difference between the trees in their characteristic marks, that they cannot be distinguished as different species, though in the growth of the trees there is a remarkable difference. In the last, the cones are much larger than those of the common sort, and end in acute points; the scales prominent, like those of the first species, and have little resemblance to those of the larch. They are of a shrubby, spreading growth, but so hardy as to thrive in the open air without any protection. But in the first, of which the branches are more slender, with a bark more inclining to yellow, and the scars more slender and clustered; the leaves are more tender, narrow, more glaucous, and the outer ones in each bundle shorter; cones only one-third of the size, blunt, with scales scarcely exceeding twelve in number, thinner, more shining, retuse, emarginate; the wings of the seeds are straight, more oblong, narrower, and, together with the seed itself, of a more diluted grey colour. And in the second, the bark of the branches is of an ash-coloured grey; the leaves a little wider, bright green, all nearly equal, commonly more than forty in a bundle; the cones an inch long, with above thirty woody, striated, rounded, entire scales; the seeds brownish-grey, with subtriangular wings, somewhat bent in. In both the cones are bent upwards, on very short peduncles.

It is observed by the editor of Miller's Dictionary, that "no tree is more valuable; or better deserves our attention in planting than the larch." It is a native of the south of Europe, and Siberia.

The timber is not only used in houses but in naval architecture also. "It seems to excel," he says, "for beams, doors, windows, and masts of ships; it resists the worm; being driven into the ground it is almost petrified, and will support an incredible weight; it bears polishing excellently

well, and the turners abroad much desire it. It makes everlasting spouts, pent-houses, and feather-edge, which need neither pitch nor painting to preserve them; excellent pails, posts, rails, props for vines, &c.; to these we may add the palettes on which painters separate and blend their colours."

It has been observed in Ireland, that no tree grows so speedily to so large a size as the fifteenth sort, or the silver fir. Some at forty years growth, in a wet clay on a rock, measuring twelve feet in circumference at the ground, and seven feet and a half at five feet high; one tree containing seventy-six feet of solid timber. The earl of Fife also remarks that no trees make a greater progress than this and the larch. It is found to be excellent for boat-building.

The seventeenth sort has very much the habit of the silver fir, but the leaves are wider and blunter, disposed on each side along the branches like the teeth of a comb, but in a double row, the upper one shorter than the under; underneath marked with a double glaucous line, and each has eight rows of white dots, and are often cloven at top.

The appellations of white and black in the seventeenth and eighteenth sorts are given from the colour of the bark, as there is little difference in the colour of the wood, and the leaves of the black are whiter on their under side than those of the white. They are both natives of North America; the white upon the mountains; the black upon the low grounds, generally in bogs or swamps. The first is by much the largest tree. This (the black) sort is easily known by its narrow leaves, placed on every side of the branches, and its long pendulous cones, which do not fall to pieces on the tree, but drop off entire the following summer; the scales open and emit the seeds on the first warmth of the spring.

There is a variety of this tree cultivated under the title of the long-coned Cornish fir, in which the leaves are longer, broader, of a lighter colour, and fuller on the branches; the cones also longer.

In the nineteenth sort there are two principal varieties; the white and the red, both of which afford the white deals. And *Burgundy pitch* is prepared from the resin procured from this tree by boiling and straining it through a cloth.

There is no tree that yields greater profit than the spruce fir in cold land; no tree is more beautiful standing single on turf in large plantations, or more useful for shelter in cold soils and situations.

*Method of Culture.*—In all the sorts and varieties the increase is effected by means of seeds, which may be obtained from the well ripened cones by exposing them to the heat of a gentle fire, or that of the sun, in which way the cells open and the seeds may be readily taken out. When the cones are not made use of in this way, they will remain several years without the seeds being injured, especially where they are close.

They should be sown in the early spring months, as March or the following month, on beds of fine earth, in a north-east aspect, or in large pots or boxes for the purpose of being occasionally removed into different situations as may be found necessary. They should be covered with nets to prevent the birds from pecking off the tops of the young plants, while the husks of the seeds are upon them; and be likewise screened from the heat of the sun at first.

All the sorts, except the stone pine and a few others, the scales of the cones of which are very hard, soon come up; but these frequently remain more than a year; the ground should therefore not be disturbed, being only kept clean from weeds in such cases.

Soaking

Soaking the seeds in these cases may be useful, as well as sowing them in shaded situations.

The young plants in all the forts should be kept quite clean, and occasionally refreshed with water when the season is dry, in a very gentle manner, so as not to disturb the plants.

When they come up too close, the plants should be thinned out in the summer, the thinnings being planted out immediately in a separate bed, in a shady place, being gently watered as there may be occasion. They should be set out in rows at the distance of four or five inches, and three or four in the rows. The tender kinds should be sheltered during the winter by frames or mats from the frosts, but with the others it is unnecessary.

When the plants have remained in these beds a year or more according to circumstances, they should be removed into other rows in the nursery at the distance of two feet, and one or more in the rows. In this situation they should remain till the periods of their being finally planted out.

The best season for the removal of the plants in all cases is towards the latter end of March, or the beginning of the following month.

Where it can be done, it is the best way not to let them remain too long in these nursery situations, as the plants are always found to succeed best when planted out before they have acquired too large a growth.

When large plantations are to be made, it is advised by some to raise the plants on a portion of the same ground, or as nearly similar to it as possible.

It is advantageous when they are to remain, to have a large size to transplant them every two years, as by that means they form better roots, and such as spread out more laterally, and of course the plants may be afterwards removed with greater safety.

In removing the plants, at all times great care should be taken to preserve the roots as much as possible, as well as all the branches, without cutting them.

When they have been finally removed, they require little more trouble, it being only necessary to keep them perfectly free from weeds, and supporting the larger sorts of plants with proper stakes; all the sorts should be suffered to take their own natural growth; being careful to preserve their tops perfectly entire, to shoot up as fast as possible, and to branch out in their own way, as no pruning is wanted, unless in the lowermost branches in particular trees which are thought too low and straggling, when these may be occasionally trimmed, cutting them close to the stem; but pruning should be very sparingly practised to these resinous trees, as lopping the branches contributes to retard their growth as well as impair their beauty. In large forest plantations, where the trees are arrived to a large growth, it is, however, customary to lop their lower branches gradually for faggots, according as they begin to decay; for where these trees stand close, the upper branches generally kill those below, so that the lower tiers decay gradually and successively; in which case these decaying lower branches may be lopped by degrees in winter.

After the plantations designed for timber-trees have had eight, ten, or twelve years' growth, it may be proper to begin to thin them; those thinned out may serve for many smaller purposes, being careful in thinning to leave a sufficiency of the finest plants standing at proper distances to grow up for timber.

These trees are all highly ornamental evergreens for the pleasure-grounds.

In regard to the distribution or arrangement of the trees in the plantations, and mode of planting, those designed for

the shrubbery and for ornamental plantations may be disposed both in assemblage with other trees, and to form clumps, and continued plantations. Those intended as forest trees should generally be disposed alone in considerable plantations. The method of planting them is the same as in other hardy trees; but where large plantations in out-grounds are intended either for pleasure or profit, there will not be any great necessity for a previous preparation of the soil, with respect to digging or ploughing, only just to dig a hole for each tree; the same rule may also be observed in planting clumps of them in lawns, parks, and other grass-grounds, the mould being made fine in the bottoms of them. Those designed principally for ornament should be disposed at such distances as that their branches may extend freely every way; as the beautiful display of the head is a great merit in these trees in such plantations; but those intended for timber plantations may be put only four or five feet distant, in order that they may draw one another up straight and tall more expeditiously, and to admit of a gradual thinning after a few years' growth, for poles, &c.

The proper methods of raising and planting out all the different sorts, in the view of affording timber or shelter in large plantations, may be seen in the new edition of Miller's Dictionary.

PINUS, in *Ornithology*, a species of *Certhia*; which see.

PIN-YANG, in *Geography*, a city of China of the first rank, in Chan-si; 337 miles S.W. of Peking. N. lat. 36° 6'. E. long. 111° 0'.

PIO, ALBERTO, in *Biography*, prince Carpi, son of Leonello, lord of Carpi, by a sister of the celebrated Giovanni Pico of Mirandola, was born about the year 1475, and first studied in the university of Ferrara under Pomponazzo. He pursued his studies with great ardour at Carpi, whither he had invited several learned men, among whom he distinguished Aldo Manuzio as his particular instructor. After his father's death, he, with his brother Leonello, had a common dominion in the territories of Carpi, with Giberto and other sons of Marco, another branch of the same family. This divided authority produced dissensions, which, from 1494 to 1500, occasioned a bloody civil war. After a time, Alberto connected himself with the French party, and in 1510 he visited the court of Lewis XII., and was dispatched by him in a mission to pope Julius II., and some circumstances now occurred which led him to believe that it was his interest to quit the French party, and to join that of the Imperial, the latter being the stronger in Italy, which he did not hesitate to say was the motive by which he was governed in his political alliances. He resided a long time at Rome as the emperor's ambassador at the papal court, and was singularly esteemed by Leo X., who conferred upon him several castles in Romagna. In the subsequent wars his principality was frequently taken by different parties, and Alberto was possessed and dispossessed of the sovereignty. He again adopted the French interest, which occasioned the final loss of Carpi, that was transferred by Charles V. to Alfonso, duke of Ferrara. He was at Rome during its sack in that year; and took refuge with Clement VII. in the castle of St. Angelo. Being afterwards delegated by the pontiff to Francis king of France, he was very handsomely received by that monarch, and died at his court in 1531, in the 56th year of his age. Notwithstanding the vicissitudes of his life, and his various political occupations, Alberto did not cease the cultivation of letters; he was a zealous adherent to the see of Rome, and gave all the opposition in his power to the doctrines of the reformers. At this time Erasmus made a considerable figure in the world, and Alberto spoke pretty freely of the tendency of his various

rious publications, and what he said was reported with much aggravation to that celebrated man. In consequence he wrote, in October 1525, a letter to Alberto, acquainting him in a friendly manner with what he had heard, and subjoining a short defence of himself. To this Alberto replied in a long epistle, which, with Erasmus's letter, was afterwards published at Paris. This led to farther discussion on both sides, and in one of his letters, Alberto launched out into an examination of all the works and opinions of Erasmus, and of those of Luther, and the other innovators of the time. He died, while the work was printing, at Paris, but it appeared in the same year under the title of "Alberti Pii, &c. tres et viginti libri in locos lucubrationum variorum D. Erasmi Rotter." This work is highly commended by Tiraboschi, who says "it has none of the scholastic barbarism, but is written with erudition, force, and not without elegance." It should be observed, that he was supposed to have been assisted by Sepulveda, and other learned men whom he kept in his house. His works have been collected and published in folio at Paris, and also at Venice.

PIOBBICO, in *Geography*, a town of the duchy of Urbino; 11 miles S. of Urbino.

PIOBACH, a Gaelic term, denoting an air played upon the bag-pipe; and now more strictly applied to the ancient Highland martial music. This air is said to be peculiarly expressive. Piobracks are either simple or compound; some of them consist of a march, &c. and are beautifully varied, and highly characteristic.

PIOMBA, in *Geography*, a river of Naples, which runs into the Adriatic, N. lat.  $42^{\circ} 56'$ . E. long.  $13^{\circ} 9'$ .

PIOMBINO, a principality in the central part of Italy, consisting of a small portion of the Italian shore, and the opposite isle of Elba, subject, in the 13th century, to the Pisans, and after several revolutions transferred to the family of Appiano, as a detached principality, in 1399. In 1501 it was seized by César Borgia, but after the death of pope Alexander VI. returned to the house of Appiano. In the 16th century the isle of Elba was repeatedly ravaged by the Turks. The principality recently passed to the house of Buoncompagni, that is, the dukes of Sora, a Neapolitan family, which owes its fortune to the pontiff Gregory XII., and in 1801 annexed to the new kingdom of Etruria. It is situated on a peninsula, in a bay of the Mediterranean, called "the gulf of Piombino." Piombino is a small neglected town; 33 miles S.W. of Sienna. N. lat.  $42^{\circ} 57'$ . E. long.  $10^{\circ} 34'$ .

PIOMBO, SEBASTIAN DEL, in *Biography*, called also *Venetiano*, from Venice, the place of his birth, which occurred in 1485. He was renowned in early life as a musician, and particularly for his skill in playing upon the lute. While he was yet in his youth, he abandoned that science, and was taught the rudiments of the art of painting by Giovanni Bellini; but as Giorgione da Castel Franco had just then exhibited his improved mode of colouring and effect, Sebastian placed himself under his tuition; and in the end acquired a well merited and great renown, both in painting portraits and historical subjects.

His first essays were in the former class, and they were greatly admired for the strength of resemblance, and the sweetness and fulness of style with which they were executed; and were frequently mistaken for the work of Giorgione. His portrait of Giulio Gonzaga, the favourite of cardinal Hippolito di Medici, is by many writers spoken of with extreme delight, and called a divine performance, full of life and character. He finished his works with great care; folding his draperies with great felicity, and giving great truth and exactness of action to the heads and hands.

By the persuasion of Agostino Ghizi, a rich merchant of Sienna, he was induced to go to Rome; where the novelty of his style, and his skill in execution, soon drew him into public notice. He there became an historical painter, and wrought equally well in fresco and in oil. In the contest of opinion which took place at that time concerning the superiority in merit of Raphael, or M. Angelo, Sebastian gave the preference to the latter, and gained his esteem and support. In consequence he was favoured by him on all occasions; and so highly estimated, that he stimulated him to the rash attempt of rivalling Raphael; particularly by painting a picture in competition with that great man's last great work, the Transfiguration; which had just been placed, with great éclat, in the church of St. Pietro à Montorio. The subject Sebastian chose, was the resurrection of Lazarus; for which Michael Angelo is supposed to have furnished the design, or at least to have considered and touched it. The picture is of the same size as Raphael's, and, when completed, was placed in the same Confraternity, and was very highly applauded. The cardinal di Medici sent it to his bishopric of Narbonne, and it became the property of the duke of Orleans. It is now in England, and in possession of J. Angerstein, Esq. who gave 2000 guineas for it to the proprietors of the Orleans collection. Although it is a work of profound skill, and highly preserves the reputation of its author, yet, in our opinion, it is not to be compared with the great work it was intended to rival, either in design, in expression, or effect; whatever may be said of its execution.

Sebastian continued to exercise his talents, particularly in portraiture, with great industry and success, till he obtained the office of Frate del Piombo; when he ceased to paint for profit; and was henceforward known by the name of Sebastian del Piombo. He lived in great esteem with pope Clement VII., whose portrait he painted with great power and fidelity; as well as that of the ingenious satirist Aretine; and those of many persons of rank and renown. He obtained great praise for having discovered a mode of preventing oil colours, employed on plaster, from becoming dark; which he did, by applying, in the first instance, a mixture of mastic and Grecian pitch. Having passed through a life of great honour and emolument to the age of 62, he then shared in the common fate of human nature, and died in the year 1547.

PIONEER, in *War*, a labourer employed in an army, to smooth the roads, pass the artillery along, and to dig lines and trenches, mines, and other works.

Menage derives the word from the Latin *peditores*, a diminutive of *pedites*. Bochart deduces it from the *Pæones*, a people of Asia, whose principal employment was to dig the earth in mines, &c.

Most of the foreign regiments of artillery have half a company of pioneers well instructed in their business. Our regiments of infantry and cavalry have three or four pioneers each, provided with aprons, hatchets, saws, spades, and pick-axes. They have also a cap with a leathern crown, and a black bear-skin front, on which is the king's crest in white, on a red ground, and the number of the regiment on the back part of the cap.

PIONSAT, in *Geography*, a town of France, in the department of the Puy-de-Dôme, and chief place of a canton, in the district of Riom; 22 miles N.W. of Riom. The place contains 1680, and the canton 8026 inhabitants, on a territory of 170 kilometres, in 10 communes.

PIONTAK, a town of the duchy of Warsaw; 20 miles E.S.E. of Lenciez.

PIONY, in *Botany*. See *PÆONIA*.

PIORAS *Fort and Village, Old*, in *Geography*, are situated in the north-west territory of America, on the west shore of Illinois river, and at the fourth end of Illinois lake; 210 miles from Mississippi river. The stockaded fort commands a fine prospect of the country to the eastward of the lake, to the point where the river enters it at the north end; to the westward are large meadows, and a level country full of swamps, and containing abundance of cherry, plum, and other fruit-trees. The lake, which is merely a dilatation of the river,  $19\frac{1}{2}$  miles long, and 3 broad, contains plenty of fish, and particularly sturgeon and picannao. The Indians, at the treaty of Grenville, in 1795, ceded to the United States a tract of 12 miles square at this fort. N. lat.  $40^{\circ} 53'$ . W. long.  $91^{\circ} 12' 30''$ .

PIORIAS *Wintering Ground*, a tract of land in the Indiana territory, on the south-east side of Illinois river, about 40 miles above and north-east of the Great Cave, on the Mississippi, opposite to the mouth of the Missouri, and 27 below the island of St. Pierre. On a meadow, east of the river, many miles long, and five or six broad, are many small lakes, communicating with each other, and one of them with the Illinois river.

PIORIAS, an Indian nation of the Indiana territory, who, with the Mitchigamias, could furnish, about 40 years ago, 300 warriors. They occupy the parts near the settlements in the Illinois country. A tribe of this name inhabit a village on the Mississippi, a mile above fort Chartres. This tribe could furnish, about the same period, 170 warriors of the Piorias and Mitchigamias.

PIOSSASU, a town of France, in the department of the Po; 10 miles W.S.W. of Turin.

PIOZZI, SIGNOR, in *Biography*. Though we have adhered as closely as possible to the rule of confining our remarks on musical composers and performers to the dead, of whom an opinion may be given without fear of offence, if unfavourable, or of exciting envy by eulogies; yet signor Piozzi, though still living (1814), may be excepted from this rule, as he has long retired from all professional concerns, and as we had nothing but good to say of his talents.

He arrived in England about the year 1777. His voice was not sufficiently powerful for a theatre, or spacious concert-room; but as a chamber-singer, both his voice and style were exquisite. Previous to the arrival of Pacchierotti in England (1778), signor Piozzi, who heard him at Milan, gave no *l'avant gout* of his performance, by singing several airs after his manner, in a style that excited great ideas of his pathetic powers, and upon which signor Piozzi seems chiefly, and very judiciously, to have formed his own manner of singing.

PIP, in *Rural Economy*, a disease among poultry, consisting in a white thin skin, or film, growing upon or under the tip of the tongue, which hinders the feeding. It has been supposed to arise from the drinking of puddle-water, or eating filthy meat, by some; but this is not very probable. It is usually cured by pulling off the film with the fingers, and washing the part with a solution of common salt in pure water. It is sometimes written *pep*.

PIPA, in *Zoology*, a species of *Rana*; which see.

PIPA, in *Commerce*. See PIPE.

PIPAREA, in *Botany*, a name of Aublet's, of which no explanation is given; but this omission is of small importance, the genus being almost equally unintelligible. Aubl. Guian. v. 2. append. 30. Juss. 295.—Class and order unknown. Nat. Ord. supposed by Jussieu to be akin to *Cistus*, or perhaps to his *Tiliaceae*.

Eff. Ch. Capsule triangular, of one cell, and three

valves. Seeds one, two, or three, clothed with cottony down, each inserted into a fleshy, white, fringed receptacle, attached to the middle of each valve.

1. *P. dentata*. Aubl. t. 386.—Gathered by Aublet in the forests of Guiana, bearing fruit in August. A small tree, whose trunk is four or five feet high, and four or five inches in diameter, with a reddish, wrinkled, rough bark. Wood hard, close-grained, whitish. Branches subdivided. Leaves alternate, nearly sessile, ovate, blunt-pointed, crenate, firm, seven inches long at the most, and three wide; smooth and shining above; clothed with short reddish down beneath; their midrib sending off numerous transverse veins. Stipules small, awl-shaped, deciduous, in pairs at the base of the short footstalks. Fruit axillary, sessile, either solitary or in pairs, with two little scales at its base, consisting of a thin, brittle, red capsule, spotted with green, about as big as a filberd. The seeds are entirely covered with a very fine, pure white, cottony substance. Aublet never met with the flowers, nor has any subsequent traveller given any account of this plant.

PIPARS, in *Geography*, a town of Hindoostan, in the circar of Joodpour; 20 miles S.W. of Meerta.

PIPE, a close channel for the conveyance of water, or other fluids, is of such extensive use in building, &c. as to render the consideration of its materials, and best means of forming its joints, a matter of importance to architects and engineers, that they may give stability and durability to their work, at the least expence. Water-pipes are made of wood, iron, lead, copper, stone, or pottery; and each of these materials, in different situations, has its preference.

Wooden-pipes may be procured in all countries at a small expence, are easily made, and joined together; but the great objection is their want of strength to resist a strong pressure without breaking, and their liability to decay. For water-works they are usually made of elm, or alder; oak, though far preferable, being too expensive. They are best made from small trees of the proper size; and then the bark, being left on, is thought to preserve them. The passage is bored out by a long auger, turned round by one or two men; whilst the tree is supported in a convenient position on tressels, and bound fast down upon them by ropes, to which weights are attached.

In towns where water-works are established, the demand for pipes is such as to render this method too expensive; and machines are used to bore them, turned by horses, water, or steam-engines. The pipe-boring machine is extremely simple. A pit is first dug, similar to a saw-pit; on each side of this a long timber is fixed, and the two being united, at various points, by cross framing, forms the bed, on which the sledge slides backwards and forwards as great a distance as the length of the tree which is to be bored. The sledge is a frame of wood, upon which the tree is laid when it is to be bored, and is firmly held upon it by chains passed over it, and drawn exceedingly tight with windlasses fixed in the sledge. Wedges of wood are used to support it from rolling sideways, and to raise it up to such a height, that the borer will pass through the centre of the tree. The borer is fixed at the extremity of a spindle, supported by bearings, on blocks raised from the cross framing of the bed at one end, and which are adjusted, that the line of the borer will be exactly parallel to the bed and sledge: the spindle is put in motion by wheel-work from the mill, so as to revolve 30 or 40 times per minute. The sledge with the tree is advanced towards the borer by ropes, which are conducted over proper pulleys, from each end of the sledge, to the barrel of a wheel, with handles on its circumference, similar to the steering-wheel of a ship: therefore, a man, by turning

turning the wheel one way, advances the slider, with the tree towards the borer, which penetrates into the end of it; but on turning the wheel in an opposite direction, it is withdrawn, to clear the chips of wood. This is repeated till the pipe is bored through. The borer can be detached from the spindle, to employ another of greater or lesser diameter, when the pipes require it. The elm pipes employed in the streets of London for the distribution of water, are made by this means, except such trees as are crooked: these are bored by hand augers, because they must be pierced from both ends to meet in the middle, which the machine will not readily do.

The lengths of pipe are joined together, by enlarging the bore at one end in a conical form, with a sort of auger, and cutting the opposite end taper, to drive into the conical end of the adjacent pipe, which is hooped to prevent it from splitting. This method is a very bad one, very soon decaying, even when the taper end is fitted perfectly, because the thickness of the wood at the taper part is so very small. In the usual mode of fitting them, by merely shaping the conical part with the axe and drawing-knife, whilst the workmen are perhaps over shoes in mud, and exposed to bad weather, it is scarcely reasonable to expect them to be very attentive; but the joint is fitted in haste, and dispatched as quick as possible: the consequence is, that the conical part being correctly bored, whilst the taper is made to an irregular and more obtuse cone, the joint fits only at a very narrow point; but if well driven, will make a tight fitting at first, and, when buried, escapes detection; but in the course of a very few years, the vacant space round the end of the taper accumulates mud, which hastens the decay of the wood, and the joint fails. From these circumstances, the pavement of the streets is constantly broken up, the way impeded, and the supply of water suspended. The Society of Arts have, under these considerations, offered a handsome premium, for several years past, to procure a complete remedy for these defects. Mr. Hornblower proposed a tool, or bit, to form the taper end of the pipe, with the same certainty as the cone which is bored. It consisted of a wooden plug, fitted to the bore of the pipe, and having through its centre a hole, for the reception of a round iron rod or axis, which has a cross handle at the end, like an auger, to turn it round by. Near the handle, its size is sufficiently enlarged to have a mortise, for the admission of an iron arm, which can be fixed in it by a wedge. This arm turns down, and carries a steel knife, the edge of which, by the bending, stands inclined to the round rod, in the angle the conical taper is to have: therefore, by turning the handle round, the edge of the knife describes the surface of the cone, and cuts away the wood of the pipe to that form; the round rod, being of considerable length, can slide freely in the plug at the end of the pipe, and allow the cutter to be thrust up, to cut by degrees, till it reduces the taper. The use of this tool would ensure the perfect fitting of the joints; but still the plan is defective, as before mentioned, from the small quantity of wood round the joint. Another kind of joints have, therefore, been proposed: in these the adjacent ends of the pipes to be joined are both bored out, by a taper bit, to hollow cones; and the two are united by a short iron tube, which is made in form of two truncated cones joined at their bases, and of dimensions correspondent with the conical bases in the ends of the pipes. This plan is very far preferable to the former, both in strength and durability; and as the tubes are made of cast-iron, it is not an expensive one.

Messrs. Eckhardt and Lyon obtained a patent in 1806, for a method of making wooden pipes by separate staves,

resembling a barrel, but of less curvature, and greater proportional length, so as to approach near to a cylindrical form, particularly within side. They are to be bound by iron hoops, made fast either by driving them on from the ends, or by screwing the hoops together; the lengths are to be joined together, by forming one end of each taper, and enlarging the corresponding ends of others to receive them: the staves are to be fitted by tongues, rabbeting, or dovetailing. We have not heard of this method having been practised to any extent: it would, we think, be very expensive, and have all the defects of wood pipes; being liable to speedy decay, when buried in the ground. And it generally happens, that in their rotten or decayed parts they generate insects and animalculi in vast numbers; which may always be discovered in water that has passed through wood pipes or pumps, which have been long in use. Dr. Buchan observes, that such water becomes putrid by the corruption of the animal and vegetable bodies with which it abounds.

*Iron-pipes* are cast at the iron-founderies of any dimensions; and for durability and strength combined, are greatly superior to any other material: they may be procured in lengths of ten feet, and united by nuts and screws passed through flanches, cast on the ends of them. Most of the great Companies for supplying London with water have, within these few years past, adopted cast-iron pipes for their mains, and are daily increasing them, under the conviction that their permanency will compensate for the first expence. They are usually cast in lengths of ten feet, one end with an enlarged socket of sufficient size to receive the end of the next pipe. As these joints cannot be driven close, to fit like wooden joints, they require some cement. To apply this, they first caulk it, by driving a small quantity of hemp down to the bottom of the joint with a blunt chissel, and then fill the remainder of the socket with iron cement; which is a composition of borings or turnings of cast-iron, mixed up with sulphur and sal ammoniac. This is moistened with water, and rammed into the cavity; and the rapid oxydation of the iron borings unites them into one mass, and at the same time expands the bulk of the cement, so as to fill up all the space very closely. The hemp, first driven into the joint, is only to prevent the cement getting into the pipe, and to keep the water from it till it is set firmly; after which, the joint is as solid as any other part of the pipe. Another method, much used for large pipes, is to have two ears projecting from each pipe at the joint, through which screw-bolts are passed, to draw them close together. The joints are sometimes filled with lead run in, whilst melted; and others have used the Roman cement to bed the joints in.

Within these few years immense quantities of iron pipes have been laid in all parts of London, for the conveyance of water, which no sooner became generally known, than great prejudices were excited against them, under the idea that they would give the water a metallic taste, which would be injurious to the health of the inhabitants. This is clearly an error, as any one may ascertain, by examining an old cistern, or vessel of cast iron, which has only had fresh Thames water in it; and they will find it coated with a sort of japan, or smooth surface of a black colour, which is a very thin oxyd, and does not penetrate any depth: though if the water is of such a quality as to produce red rust, the iron is corroded very fast, but is still a very harmless mixture. Water having any lime in it, deposits a thin coat or incrustation within side iron pipes, and thus completely defends them from corrosion; nor is there any danger, as some have supposed, of this incrustation increasing

## PIPE.

to as to stop the pipes in course of time, because the water only deposits the stony matter from the attraction of the iron, which being once covered with a slight thickness, the water has no longer access to the iron. We have heard of an expedient of putting lime into the water, when it was found that the water was so corrosive as to become tinged by running through iron pipes newly laid down. A rapid current of this lime-water being caused through the whole length for a few days, the pipes became coated with the calcareous matter. At first, after this, the fresh water tasted of lime, but it became pure in a short time, because, in the first instance, more lime was deposited than could be combined with the oxydated surface of the iron, and this excess would of course be carried away again by the fresh water, but no more.

*Stone Pipes.*—The prejudice the public at first entertained against iron pipes, induced many projectors to find out other substances, which would have the strength and durability of metal. Sir George Wright proposed stone, and invented a machine for cutting out cones from the hollow of the pipe. He first employs a boring or drilling machine, to pierce a small hole through the centre of the block of stone, in the axis of the intended pipe. Another machine is then used, consisting of a saw applied in a frame, which revolves on a round iron rod, passed through the central hole previously drilled: the frame gives the means of fixing the saw at any required distance from the rod, and attaching it firmly thereto at each end: its edge will of course, when turned round, describe the surface of a cylinder, of the diameter of the intended pipe. The saw and central rod are rather longer than the block of stone, which permits them to be moved backwards and forwards endways, to give the motion of sawing with sand and water in the usual manner. In their operation, the block of stone is placed with the rod horizontal; the saw is entered at another hole, previously drilled through the stone, and as the saw cuts, the central rod guides it round on a centre, till it separates the core all round, and this being taken out, leaves a pipe or tube. Sir George obtained a patent for this invention in 1805, and it was practised for some time, and many large stone pipes were laid; but great difficulties arose in making good joints: they were attempted by Roman cement, which adhered so well, as to make them perfect, if the pipes were well bedded; but the continual tremor of heavy carriages passing over them soon disturbed many joints, and broke the bond of the cement. Mr. Samuel Hill took out a patent in 1810, for uniting these pipes together at every joint by a collar of stone, into which the extremities of two pipes are made to fit, so that about two inches of each shall enter it, and reach to its centre, where they are to meet. A sufficient quantity of cement is to be spread on the ends of each pipe, and in the internal part of the collar, before they are inserted into it, to prevent water from passing through the joints. Although this obviates one difficulty, still the expence of stone pipes is prodigious; at least in London, where the price of materials alone, without any cost of workmanship, would be too great. In situations where that material is plentiful, they may be used, and the labour of making them will be reduced very low by a machine invented by Mr. Murdoch, and for which he had a patent in 1810: it is very superior to the above, which is only applicable to large pipes; besides, the trouble of previously drilling two small holes the whole length of the pipe is wholly saved.

When it is intended to form a pipe or hollow cylinder of stone by Mr. Murdoch's machine, instead of reducing the whole inside to powder, it is sawed in the form of a core, or solid cylinder, the diameter of which is about half an

inch less than the diameter of the inside bore of the pipe. In like manner, when a solid column or cylinder is to be formed, the outside and superfluous parts of the stone are taken away by a similar process, and the core forms the column or cylinder required. When the stones are large enough to leave the outside parts of a proper thickness, they may be used as pipes; or the cores cut out of large pipes may be used as columns, or formed into smaller pipes, so that in some cases several may be cut out one within another. The method by which these are formed is the following:

The block of stone, out of which the pipe is to be formed, is placed in a vertical position, and a plug of wood or metal is fixed in the top of the block, at the centre of the intended pipe; this plug has a hole in its centre, for receiving the lower pivot of a vertical spindle or axis, which is made longer than the pipe is required to be. The rod is of an uniform thickness, and made either square, triangular, or any other shape that will admit of sockets sliding freely up and down, without turning round upon it. On the upper part of this spindle a socket is fitted, having on the middle part of its outside a pulley or a small-toothed wheel, by which the axis or spindle may be turned round. The upper and lower extremities of this socket are cylindrical, and serve as gudgeons, upon which it turns in a frame, and steadies the axis. Near the lower end of the vertical axis a wheel with arms is fixed, having the circumference like a hoop two or three inches broad; and its diameter a little less than the diameter of the pipe to be bored: it fits to the inside of a tube of metal, which is attached to the spindle, and kept concentric with it, by being fitted over the wheel. The upper part of the spindle is perforated to a little below where the above-mentioned socket is fixed, and then the perforation comes out obliquely. The tube is of a diameter nearly equal to that of the pipe to be formed, and exceeding it in length about two feet: this pipe is made as truly cylindrical as possible, and is attached to the axis by another wheel across, similar to that at the bottom, which is fixed in the tube at the upper end, and fits upon the square spindle, to slide freely up and down, without turning round upon it; this tube being, as before-mentioned, guided by fitting on the wheel fixed at the lower part of the spindle. On the lower edge of the tube a rim of proper metal is fixed, which is so much thicker than the tube, that the groove it makes in the stone may admit the tube to move freely. This hoop being intended to grind or saw the stone, has its lower edge either left smooth, or formed like the saws used by stone-cutters. The wheel or cross, which is fixed on the vertical tube, near its upper end, has a small cord or chain fastened to one of its arms, and passes upwards through the perforation in the upper part of the axis, and then over a pulley fixed at a convenient distance above it: it serves to raise the tube on its axis when required. On the upper part of the tube weights are fixed, for the purpose of making it act more forcibly upon the stone, if necessary. When the apparatus is to be put in motion by the force of man, the above-mentioned pulley, fixed in the socket near the upper part of the axis, is generally made about double the diameter of the pipe to be bored, and a rope passes round it, each end of which is conducted over a vertical pulley, fixed at a convenient distance, on each side of the machine; by which means the ends of the rope turn downwards, and having handles fixed to them, are pulled alternately by a man at each end, so as to cause the tube to make a reciprocating rotative motion about its axis or spindle: or the apparatus may be put in motion by any other power, only if the pulley and cord be retained, a spring or a sufficient weight acts

at one end, while the power operates on the other by means of a crank, or other similar contrivance. Or, instead of the pulley, a toothed wheel or pinion is substituted, and acted upon by a reciprocating toothed wheel, belonging to the mill, engine, &c. connected with the moving power, or by a reciprocating rack or sector, put in motion by the same power or machinery. A cistern is placed at some convenient height above the tube, by means of which, a mixture of water and sand is conveyed into the tube, and forces its way under the saw, when in motion, and causes it to abrade or grind away the stone, and form in it a circular groove, concentric with the axis. As the groove becomes deeper, the water accumulates in the tube, and forces the sand with it under the saw and both are discharged over the outer edge of the tube, in the form of mud or sludge, and the motion of the tube may be thus continued as long as the moving power is maintained. When any circumstance causes this to stop, the tube must be drawn up by means of the cord and pulley for that purpose, or the sand will set fast round the tube, and will not be easily freed again.

*Copper-pipes* are too expensive to be employed except in particular situations. They are made of copper plate turned up and soldered, and are much used in distillers' work, because they can be tinned within, and then communicate no taint to what passes through them.

*Lead-pipes* are universally employed for all small water pipes, chiefly from the facility of bending them in any direction and soldering their joints. Although some kinds of water corrode the metal by degrees, this will not produce so much harm as iron under the same circumstances, but would be a most dangerous poison if it was used in sufficient quantities to have any effect at all.

The greatest proportion of the leaden pipes used in water-works, was, till of late years, made of sheet lead wrapped round an iron or wooden core, and the joint soldered up. The expence and trouble of this method was considerable, and the pipes thus made extremely liable to burst at the joint, particularly if bent with a sudden angle. These defects suggested the idea of casting the lead in the form of pipes, by which means the trouble of previously casting and laminating the lead into sheets would be spared, and also the uncertainty of the soldered joints. Such pipes are cast in an iron mould, made in two halves, forming, when put together, a hollow cylinder, of the size of the intended pipe. A core, or iron rod, the size of the bore of the pipe, is adapted to this hollow mould when the halves are put together, and secured by screws or wedges, so that it exactly occupies the centre of the hollow mould, leaving therefore an equal space all round between them. A spout, or entry for the admission of the melted lead, is made by a corresponding notch cut in each half of the mould, and at another place is a similar vent for the escape of the air. This mould is fixed down upon a long bench; and a rack, moved by toothed wheels and pinions, is fitted up at one end of it, in a line with the centre of the mould. A hook at the end of the rack, being put into an eye at the end of the core of the mould, affords the means of drawing out the core, when the pipe is cast round it by pouring the melted lead into the mould, with the core in it: when the lead is cold, the core is drawn out very nearly to the end of the pipe, by the rack and wheel-work before mentioned. The halves of the mould are then separated, and the pipe moved along in the mould, so that only an inch or two of its end remains in the mould, the halves of which are again fastened together with the core between them, and its end entered an inch or two into the first piece of pipe. The mould is now filled with melted lead, the heat of which fuses and unites it with the end of the first piece, so as to double

its length. The core is again drawn out a second time, and another length cast to the former. This method produces pipes of any length in one piece, but they are liable to have air-bubbles in them, which produce holes when the metal is thin, and the joinings of the different lengths are not always perfectly sound.

The method which is now very generally adopted, is to cast the lead in an iron mould, upon a cylindrical iron rod of the size for the bore of the intended pipe, the lead being three or four times the thickness of the intended pipe, and in short lengths, which are then drawn through holes in pieces of steel, in the manner of wire drawing, till the pipe is reduced to the intended thickness, and drawn out to the proper length. Another method is to reduce the pipe by repeatedly passing it through the two rollers of a flattening mill, in each of which a number of semi-circular notches are formed all round, so that the two rollers, when put together, have a number of circular cavities between them, which gradually diminish in diameter from one end of the rollers to the other. Drawings of such rollers will be found in our plates of *Iron Manufacture*. The pipe is first rolled between the largest of these cavities, then in a smaller, and so on to the last, which extends the pipe to its proper length, and diminishes its substance to the proper thickness, at the same time by condensing the metal hardens it, and makes a very strong tube with very little metal. Mr. John Wilkinson of Broseley, the celebrated iron manufacturer, took out a patent, in 1790, for the last mentioned method, which he practised on a very extensive scale: he was not, however, the original inventor, the same thing having been proposed, in 1728, by M. Fayolle; see "*Machines Approuvées par l'Académie Royale*," vol. v. p. 50. Since the expiration of this patent many manufactories of this article have been established, some employing rollers, and others the draw-bench, for extending the pipes.

We have given a representation of one of the latter machines in *Plate XL. Mechanics. Figs. 1 and 2* are sections of the mould for casting the pipes; A A is the bench, supported on legs like a stool in an inclined position; B, B, are the two halves of the mould, fitted into each other with double rebates, as shewn in the section *fig. 1*, that they may come together correctly, and are held so by the screws D, D, fitted through pieces of iron E, E, fastened to the bench; the halves of the moulds have at each end a flat side beneath, which rests upon the iron plate connecting the two pieces E, E; F is the core, held in its position by collars at each end of the mould embracing it; G is the rack, and H I K the wheel-work for drawing out the core; *d* is the entry for the metal, raised up to the same level as the highest point the metal is intended to run into. The intention of the inclined position for the mould is, that the metal may run in at the lowest point of the mould, and expel the air as it rises, at a vent in the highest point of the mould, which is *e*. By this means the danger of air-bubbles in the pipe is avoided. The interior surface of the mould is bored out truly cylindrical, and the core being turned in the lathe, they are certain when put together to leave an equal space all round, a circumstance which is essential to form a good pipe, as the succeeding process of drawing will tend to make an error of this kind worse. The core, F, is seen in *fig. 2* to have a neck or smaller part at the end *d*: the treble or core *a g*, *fig. 3*, upon which the pipe is to be drawn, is of the same size, and has a similar neck, so that the pipe, when put upon it, fits it in every part, as is shewn in *fig. 3*, and the shoulder of the neck prevents the treble being drawn through the pipe in the direction from *g* to *a*, as it was put in by the opposite direction. Beyond the neck the treble has a notch cut in each side at *g*, leaving a neck;

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a neck; and by this it is seized in a sort of claw belonging to the draw-bench, which is exhibited in *figs. 4 and 5*, the former being a plan, and the latter a section. In these *L, M*, are two strong timbers, bolted to uprights *N, O*, at one end of each, and to a cross beam, *W*, at the other end; the uprights support bearings for the gudgeons of a strong iron spindle, which has the cog-wheel, *k*, fixed upon its end, and is turned round by the pinion *l*, receiving a rotative motion from a steam-engine or water-wheel; *P* is a roller, fitted on the spindle so as to slip round freely upon it; it has two claws affixed into it at one end, which are seized by the ends of an iron bar, *m*, fixed fast upon the spindle. By this means, when the roller is thrust towards *m*, it is engaged with its arms, and compelled to turn round with the spindle, but when drawn back from *m*, it is at liberty to slip round independent of it; *Q* is a lever affixed to a vertical axis; it is forked at the end, and embraces a collar upon the end of the roller, so as to draw it backwards or forwards, and by this means engage or disengage it from the spindle at pleasure; *R* is another lever on the same spindle, to the end whereof a long rod, *S*, is jointed, and this has several handles fixed to it, as shewn in *fig. 5*, by which it can be moved, and the machine stopped or put in motion by a man standing at any part of the long bench *L M*; the roller, *P*, has a pair of spiral grooves formed on its circumference, for the reception of two chains, *n, n*, which wind upon it; the ends of these chains are hooked to a little carriage, *p*, running upon two wheels, and having in its hinder part a fork or double claw, to catch in the notches at the end of the treble *T*, also shewn in *fig. 3*; *X* is a cast-iron frame, securely bolted down upon the cross beam *W*; it has a notch in its upright side, which is nearest the roller, to allow the treble and pipe to pass through, but at the same time forms a lodgment for the steel plate, through which the pipe is to be drawn. The workmen are provided with a great number of these plates, one of which is shewn in *fig. 6*; they are called whirtles: the sizes of the holes through them diminish very gradually, from the diameter of the rough cast pipe, to the size to which it is intended to be reduced. The holes through them are made rounding at each side, as is shewn in the section *Z*, *fig. 6*, to facilitate the exit and entry of the pipe. The bench is continued beyond the beam *W*, and has a number of rollers in it, to support the pipe as it is drawn along.

The process of drawing is as follows: the lead pipe being fitted upon the treble, as in *fig. 3*, is laid upon the rollers in the bench, and the end of the treble being put through the largest of the set of whirtles, its end is hooked into the claws in the carriage *p*, and the whirtle lodged against the cheeks of the frame *X*: the rod, *S*, is now pulled, which engages the roller with the spindle (supposed to be all the while in motion); this winds up the double chains *n*, drawing the pipe through the whirtle, by which it diminishes its size and lengthens it out: when the pipe is drawn quite through, the roller is cast off by pushing the rod *S*; the treble is unhooked from the carriage, and pushed back upon the rollers in the bench to its former position; another smaller whirtle is put on; the carriage is drawn back by hand (the roller turning round on its spindle), and the pipe is drawn through it as before. In this manner the business proceeds till the pipe is finished.

Sometimes the pipe is drawn through twelve sized whirtles in this case; the second time, and also the last time but one, it is drawn through a whirtle such as *Y*, *fig. 6*; it is not rounded off at the entrance, but having a sharp edge, it cuts off shavings from the surface of the lead, making it perfectly smooth and true: this makes it pass more easily through the succeeding whirtles. Lead pipes are by this

process drawn out to ten or twelve-foot lengths, three of which are united into one, by what is called *burning*. For this purpose an iron core is put through one pipe, and entered a few inches into the other: a small iron mould is now put together in two halves over the ends of the two pipes which are brought in contact, the mould exactly fitting both; melted lead is poured into the mould, and it runs out again at a hole in the bottom. This is continued till it is supposed the heat of the lead has fused the ends of both the pipes; the hole in the bottom is then stopped by a slider for the purpose, and the mould remains full: when cold it is taken off, and the pipes are perfectly united. The core is now withdrawn, to facilitate which, it only fits the bore of the pipe at a few inches of the end. These joints are very good if the pipe remains straight, but are apt to leak if a bend is made at one of them.

In 1804, Mr. Alderferon took out a patent for lead pipes which were to be lined with tin, for the conveyance of beer, water, or other fluids which were in danger of receiving a taint from the corrosion of the lead. This he accomplished by casting a lead pipe in the manner above-described, then withdrawing the core, and throwing into the pipe a small quantity of powdered rosin. Another core smaller than the former is next inserted into the centre of the pipe, and melted tin poured in to fill up the space. The pipes are cast in a vertical position, and the rosin melting by the heat floats upon the surface of the tin, and acts as a flux to unite it with the lead. This pipe of lead, lined with tin, is now to be drawn or rolled to length, as before-mentioned. We are informed Mr. Alderferon employs rollers to extend them instead of the draw-bench.

Mr. Bramah's method of making lead pipes is very ingenious; it is performed by a process of pumping or forcing the metal, in its fluid state, through proper moulds. A boiler or kettle is fitted up over a fire-grate, with flues for the fusion of the metal; in the centre of this boiler a force pump is fixed up, its suction valve drawing in the melted lead contained in the boiler: the forcing pipe of the pump proceeds through the side of the boiler, and conducts the lead to the mould, which is fixed on the end of the pipe outside of the boiler: it consists of a tube, bored perfectly smooth and cylindrical, its interior diameter being equal to the outside of the pipe intended to be made; the end of the mould nearest the boiler expands into a conical mouth, larger than the mould itself, and across this widest part a cross bar is fixed, to support a core or mandrel, of a diameter equal to the bore of the intended pipe, and situated exactly in the centre of the mould, leaving an equal space all round between them: the core is slightly conical, being rather less at its extremity, which terminates at the same length with the external mould. There must be sufficient openings left at the sides of the cross bar supporting the core, to allow the lead to pass freely by, that it may unite again after passing the cross, and completely fill the mould. The mould passes through one of the fire flues surrounding the boiler, that it may be kept to hot as to procure the lead in its fluid state, till it arrives nearly at the point of the mould, which is immersed in a cistern of hot water. The operation is simple: the pump, being worked, forces the lead through the mould, the heat and length of which are so regulated, that the lead may chill a little before it quits the extremity of the mould, and issues forth in a solid state into the water cistern, forming a pipe of any length. Mr. Bramah took out a patent for this method in 1797.

*Pipes of pottery ware* are usually made of that coarse kind of brown stone pot, which is very hard and durable; they can only be made in short lengths, and have one end enlarged

to receive others. To close the joints tow and pitch are used, but they can never be made to bear any pressure, are liable to be broken by accident, and being very expensive, have no other recommendation than preserving the purity of the water they convey.

We have seen some water conduits from an old Roman building, which were very slight pottery tubes, buried in a mass of mortar, that by ages had acquired a hardness and closeness sufficient to resist a strong pressure.

In 1808 Mr. W. Bell obtained a patent for a new kind of pipes for conveying water, which were to be made of such substances as to give no taint to the water passing through them. He proposed tubes of porcelain pottery, and various compositions which are vitrifiable, and are not liable to corrosion or decay: these tubes are formed in such a way at the ends as to fit one within the other, and are to be made water tight by cement; they are to be enclosed in cast-iron cases, to give them strength to resist the internal pressure of water, as well as to defend them from accidental violence; or the cases may be made of wood.

**PIPE, Tobacco**, an implement used in the smoking of tobacco, consisting of a long tube, made of a particular kind of clay baked hard: at one end a little cavity or furnace is formed, called the *bowl*, which is for the reception of the tobacco when burning, and the fumes are drawn by the mouth through the other end of the tube. The making of tobacco pipes forms a considerable trade in London and other great towns; they are made of various fashions, long, short, plain, worked, white, varnished, unvarnished, and of various colours, but the same process is followed for all of them. The clay is found in the isle of Purbeck, in Dorsetshire, and is distinguished from others by its perfect white colour, and its great adhesion to the tongue when baked, occasioned by its great affinity for water: even in the raw state it has this property in a slight degree. The clay is prepared by dissolving it in water in large pits, and the solution being well stirred, is run off into another pit, where it deposits the clay, which, when the water has become clear and run off, is taken up for use, all impurities of small stones, sand, &c. being separated from it and left in the first pit. The clay is now divided into portions, each sufficient to form one pipe, which are rolled on a table, under the hand, into long rolls, each with a bulb at the end, to form the bowl; and these are laid by a day or two, to dry sufficiently for the pressing. This is done in an iron mould, consisting of two halves, which when put together leave a cavity of the shape of a pipe; a wire is thrust up the roll of clay, to form the bore of the pipe, and in this state it is placed between the two halves of the mould, which are then put into a kind of press or vice, by the screw of which the two halves are forced together, and the figure of the pipe imprinted on the clay included between them; a lever is next brought down, which is so situated as to introduce a stopper into the bowl of the pipe whilst still in the mould, and force it down sufficiently to form the cavity thereof: the wire is thrust backwards and forwards, to prick the tube completely into the bowl; it is then wholly withdrawn, the parts of the mould separated, and the pipe taken out, the superfluous clay removed with a knife, and they are laid up to dry a day or two, after which they are scraped and polished with a piece of hard wood, the tubes of the pipes curved as they are intended to be, and they are then carried to the furnace to bake, which is done in seven or eight hours for fifty gross of pipes. This furnace is fully described at the end of our article **FURNACE**.

The Turks use pipes of three or four feet in length, made of rushes, or of wood, bored at the end; they have a

bowl or pot of baked earth to contain the tobacco, which they separate from the tube when they leave off smoking. To make the tube tight, some kinds are made of spiral wire covered with leather. This at the same time leaves them flexible, and the bowl can stand on the ground, whilst the smoker inhales its fumes through an ivory or silver mouth-piece at the end of the tube. Of this kind is the *hookah*, or *boukar*, used by the luxurious East Indians; it is a complete furnace or chafing-dish, with grate-bars, ash-pit, &c.; and has a tight cover over the top, with one of these flexible pipes attached to it. An officer of the court of a petty eastern prince is called *boukar boudar*, and is solely employed in managing this machine; which, having lighted and prepared, he presents the mouth-piece of the tube to his master after his dinner. In some instances, the bowl is kept in an adjacent closet, the pipe being conducted through a hole in the wall. Some of those which are most complete have another peculiarity; the smoke, before it goes into the tube, is made to pass under water, by bubbling up through it. This is found to give the smoke a mild and agreeable flavour, by depriving it of its acrid and pungent taste; and, indeed, it is for the same end of condensing these particles, that the tubes are made of such great length. We are not informed how the smoke is made to pass under the water, but have seen a simple experiment, which any one may try, to experience the improvement of the smoke by this process. Procure a common decanter or glass bottle, fill it half full of water, and fit a cork to it, which has two holes made through it by burning, sufficiently large to admit tightly the tube of a tobacco pipe: in one of the holes fit a pipe with a bowl, the tube end projecting so far down into the bottle, that it will be an inch below the surface of the water: into the other hole, fit a pipe without a bowl, not reaching to the water, but sufficiently curved or inclined to come conveniently to the mouth. Make all the joints tight by wax, fill the bowl of the pipe with tobacco, and light it; then by sucking air through the mouth-pipe, it will be drawn out of the bottle, and rarefy that within; the atmospheric air then presses through the burning tobacco in the bowl of the pipe, and carries the smoke down the tube through the water, and it rises in bubbles to the surface of the water in the bottle, from whence it can be inhaled through the mouth-pipe, by continuing to suck at it. The smoke is by this process cooled, and rendered very agreeable, by the separation of certain principles which are of a very unpleasant flavour: the existence of these principles will be shewn by the water in the bottle becoming yellow in a short time, and having a very disagreeable taste. This method of smoking may be useful to invalid smokers, who from cough, or inflammation of the lungs, are unable to continue a practice which, by long habit, has become quite an essential comfort to them.

**PIPE, in Commerce**, a measure of wine in England, Spain, and Portugal. (See **MEASURE**.) The pipe is =  $1\frac{1}{2}$  puncheon = 2 hogheads = 3 tierces = 126 gallons = 504 quarts = 1008 pints; and 2 pipes are equal to a tun of wine. The standard gauge for foreign wines at the custom-house of London is as follows: the pipe of port is 138 gallons; of Lisbon, 140; of Madeira, 110; of Barcelona, 120; of Vidonia, 120. The butt of sherry is 130 gallons, and of mountain, 120. The hoghead of claret is 58 gallons, and of tent 63. The aum of hock is 36 gallons. The gallon used here is seven inches in diameter, and six inches deep. The tonnalada of Lisbon is 2 pipas; the pipa is 26 almudes, 312 canadas, or 1248 quartillos. The barrel is 18 almudes. The pipe of the standard gauge of Lisbon at the London custom-house is reckoned at 31 almudes, and the almude

almude at  $4\frac{1}{2}$  English gallons nearly. A pipe in Spain is 27 arrobas of wine, or  $34\frac{1}{2}$  of oil; and as a Spanish botta contains 30 arrobas of wine, or  $38\frac{1}{2}$  of oil, the botta is =  $127\frac{1}{2}$  English gallons, and the pipe  $114\frac{3}{4}$ .

PIPE, *Pipa*, in *Law*, is a roll in the exchequer, called also the *great roll*.

PIPE-Office, is an office in which a person called the *clerk of the pipe*, makes out leases of crown lands, by warrant from the lord-treasurer, or commissioners of the treasury, or chancellor of the exchequer.

Clerk of the pipe makes up all accounts of sheriffs, &c. and gives the accomptants their *quietus est*. To this office are brought all accounts which pass the remembrancer's office, and remain there; that if any stated debt be due from any person, the same may be drawn down into the great roll of the pipe, from the form of which he derives his name; upon which the comptroller issues out a writ, called the "summons of the pipe," for recovery thereof. And if there be no goods and chattels, the clerk then draws down the debts to the lord-treasurer's remembrancer, to write ctreats against their lands.

All tallies, which vouch the payment of any sum contained in such accompts, are examined, and allowed, by the chief *secretary of the pipe*.

Besides the chief clerk, and his deputy, in this office are a first and second secondary, six attornies, or sworn clerks, and a comptroller, deputy and clerk, board-end clerks, and bag-bearer.

PIPE, in *Mining*, is where the ore runs forwards endways in a hole, and doth not sink downwards, or in a vein.

PIPE, *Air*. See AIR-pipe.

PIPE, *Bag*. See BAG-pipe.

PIPE-Clay. See CLAY.

PIPE-Clay and *Whiting*, in *Military Language*, a composition which soldiers use for the purpose of keeping their cross-belts, &c. clean. Every soldier belonging to the infantry of the line, and to the fencible infantry serving at home, has 4s. 4d. annually stopped from his pay for supplying himself with this composition.

PIPE-Drains, in *Agriculture*, such as are made in the more superficial parts of the earth, as a foot or more from the surface, by means of some sort of tool or implement, such as a thick iron spike, pin, or bolt, which is drawn through the ground in a horizontal manner at such depths. The improved mole plough is a very good tool for effecting these purposes, and is that which is most commonly employed in the business.

This is an excellent method of management for cold retentive grass lands, which lie in too flat and swampy a manner to shoot off their surface waters, with any degree of readiness, and which are free from stones. But though it may be found of general benefit in these cases, it is more especially so, it is conceived by some, for moist sheep pastures; it has also been found useful in some instances in arable land. When it is performed by the plough just noticed, the great strength and weight of draught which are required, especially where the older sorts of these ploughs are had recourse to, may form some objection to it. These tools have, however, much merit, and are very simple in their constructions, particularly the improved kinds, which only demand a little power of draught. See MOLE PLOUGH.

PIPE-Fish, in *Ichthyology*. See ACUS and SYNGNATHUS *Typhe*.

PIPE, *Horn*. See HORN-Pipe.

PIPES, *Organ*. See ORGAN.

PIPE, *Tail*, in *Gunnery*, a small brass pipe fixed at the swell of the musket, which receives the ram-rod.

PIPE, *Trumpet*, a small brass pipe near the muzzle of the firelock, through which the ram-rod is let down; so called from its resemblance to the mouth of a trumpet. The Prussians have no pipes to their muskets; the ram-rod being received into a cylinder which runs parallel with the barrel.

PIPE-Tree, in *Botany*. See PHILADELPHIUS and LILAC.

PIPE-Tree, *Pudding*. See CASSIA.

PIPELGONG, in *Geography*, a town of Hindoostan, in Baglana; 14 miles N.W. of Chandor.—Also, a town of Hindoostan, in the circar of Aurungabad; 32 miles W. of Aurungabad.

PIPELO, a town of Hindoostan, in the circar of Rantampour; 33 miles W.S.W. of Rantampour.

PIPEMAKER'S CREEK, a river of the state of Georgia, which runs into the Savannah, N. lat.  $32^{\circ} 8'$ . W. long.  $81^{\circ} 15'$ .

PIPER, in *Botany*, Pepper, is enumerated by Linnæus, among the Greek names of doubtful origin. The Greek  $\pi\epsilon\pi\epsilon\rho\iota$  is generally supposed to have been derived from  $\pi\epsilon\pi\eta\iota\iota$ , to cook, or digest. But the best authors give it as a primitive word; and professor Martyn rightly suggests that it is probably of Indian origin. De Theis also observes, that as the Greeks derived the knowledge and use of pepper from the oriental nations, the source of its name is to be sought in their languages, and its appellation in Arabic, *bâbary*, is the evident original of  $\pi\epsilon\pi\epsilon\rho\iota$ .—Linn. Gen. 19. Schreb. 26. Willd. Sp. Pl. v. 1. 159. Vahl. Enum. v. 1. 312. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 1. 69. Juss. 405. Lamarek Illustr. t. 23. Gærtn. t. 92. (Peperomia; Fl. Peruv. v. 1. 29. Saururus; Plum. Gen. 51. t. 12.)—Class and order, *Diandria Trigynia*. Nat. Ord. *Piperitæ*, Linn. *Urticæ*, Juss.

Gen. Ch. Cal. none. Cor. none. Stam. Filaments none; anthers two, opposite, at the base of the germen, roundish. Pist. Germen larger than the anthers, ovate; style none; stigmas from one to three, rough. Peric. Berry roundish, of one cell. Seed solitary, globose.

Ess. Ch. Calyx none. Corolla none. Berry with one seed.

A very extensive and singular tropical genus, remarkable for the simplicity of its flowers, which almost vies with that of the *Hippuris*. The number of *stamens* however is, in some cases, more than two, and in some the *stigma* is solitary. Several botanists have taken the *flower* to be gynandrous, because, at a very early period, before the germen is fully formed, the two *anthers* look as if seated on its summit, close to the *stigma*; but Jussieu well observes that they become lateral, or rather inferior, as it advances towards maturity. Linnæus has but twenty species of *Piper* in the second edition of Sp. Pl. to which five only are added in Syst. Veg. ed. 14. Willdenow has 52; but the most complete botanical view of this genus is found in Vahl's Enum. Plant., where 136 species are defined, and well described. This author properly unites the *Piper* and *Peperomia* of the Flora Peruviana, there being no solid generic difference between them; and he gives the following excellent sketch of the habit.

Stem round. Leaves simple, undivided, entire. Spikes lateral and terminal, stalked, simple, round. Flowers minute, crowded. Sheaths deciduous. In the first section, consisting of 73 species, the stem is shrubby, climbing, branched, jointed; the joints more or less knotty, and often sending forth roots: leaves stalked, alternate; some of them furnished with many nerves, proceeding, in alternate order, from the main rib, (Vahl terms such species *venoso-nervosi*); others having almost all the nerves originating from the base of the leaf (these he calls *nervosi*): footstalks channelled,

with a clasping base: *spikes* opposite to the leaves, and mostly solitary. The second section comprises 60 species, whose *stem* is herbaceous, fleshy, jointed, not knotty: *spikes* either axillary or terminal. The third section has but two species, distinguished by having no *stem*. The fourth contains one doubtful species only, *P. pinnatum* of Loureiro, Cochinch. 31, whose *leaves* are pinnate, *stem* prickly, and *flowers* unknown, so that it probably belongs to some other genus.

We shall follow Vahl's arrangement, in selecting a few examples.

*P. aquale*. Vahl n. 10. Ecl. Amer. v. 1. 4.—“Leaves elliptic-lanceolate, attenuated, smooth; equal at the base; without dots beneath. Spikes straight.”—Native of the West Indies. We have it from Dr. Swartz. The *branches* are polished, somewhat zigzag, knotty at the joints. *Leaves* four inches long, we should rather call them precisely ovate, and pointed, very smooth, with many lateral curved ribs, springing from the main one, and connected by fine interbranching veins. *Spikes* an inch or more in length, exactly cylindrical, obtuse, solitary, opposite to each leaf, their *stalks* about the length of the *footstalks*, which is usually a quarter of an inch.

*P. aduncum*. Hooked Pepper, or Spanish Elder. Linn. Sp. Pl. 41. Vahl n. 24. Willd. n. 17. Ait. n. 6. Jacq. Ic. Rar. t. 210.—Leaves ovate-oblong, or elliptic, pointed, rough; unequal at the base. Spikes hooked.—Native of the West Indies, as well as of the continent of South America. The *leaves* are a span long, rough on both sides to the touch, like a fine file, with many straight transverse ribs. *Spikes* three inches long, remarkably incurved. *Flowers* regularly whorled. Sloane says in his History of Jamaica, v. 1. 135, that the *root* is very famous, resembling ginger in taste, colour, and smell, and when fresh not inferior to it.

*P. aristolochoides*. Lamarck Illustr. 80. Vahl n. 43.—Leaves heart-shaped, acute, dotted with numerous radiating ribs. Footstalks bordered. Spikes axillary, somewhat aggregate, from a lanceolate sheath. Gathered by Commerçon in the island of Mauritius. The *leaves* are the size and shape of *Aristolochia Sipho*; the *stalks* and *branches* roughish, but we do not find them villous. *Spikes* small, two or more together. This plant is very near Forster's *methyficum*, Vahl. n. 66, and perhaps not different from it.

*P. nigrum*. Black Pepper. Linn. Sp. Pl. 40. Vahl. n. 52. Willd. n. 1. Ait. n. 1. Mill. Illustr. t. 5. Woodv. Med. Bot. t. 187. Ger. Em. 1538.—Leaves broad-ovate, pointed, coriaceous, smooth, with seven ribs. Joints of the stem tumid.—Native of the East Indies. Said in Hort. Kew. to have been introduced into the English stores, in 1790, by Messrs. Lee and Kennedy. The three central ribs, in our specimens, are combined at the base for about an inch. M. Poirer, in Lamarck's Dict. v. 5. 458, justly remarks that J. Miller alone, in his Illustr. of the Linn. Syst. has described a *corolla*, or *calyx*, of one leaf, with three notches, in this plant. No person has been able to verify this representation, nor is it known whence Miller procured his drawing, unless perhaps from his son, a botanical artist, who visited India. His plate has always been considered as a valuable addition to the history of a plant so imperfectly known to botanists, and it is pity any uncertainty should be attached thereto. Woodville's figure is a copy of Miller's. More than one species perhaps has been confounded under *P. nigrum*, particularly the *filices* of Loureiro, Lamarck, and Vahl n. 45; nor have we materials to clear up this confusion.

*P. Cubeba*. Cubebs. Linn. Suppl. 90. Vahl. n. 61.

Willd. n. 3. Gaertn. t. 92. (*Piper caudatum*; Ger. Em. 1540. Cubeba; Woodv. Med. Bot. v. 4. 165).—Leaves elliptic-lanceolate, pointed, smooth, five-ribbed; contracted and unequal at the base; the middle ribs combined half way up. Berries on partial stalks. Native of Sierra Leone, from whence we have specimens, gathered by professor Afzelius and his companion Borone, in leaf and fruit; so that no further doubt can remain as to the identity of the plant. There are others, without name or mark, in the Linnæan herbarium. We know of no figure of any part except the *fruit*, as above cited. The *stem* is round, smooth, zig-zag, striated, with rather tumid joints. *Leaves* two or three inches long, and one broad, solitary at each joint, on short stalks; furnished with three principal ribs from the base, and with two more, which spring very irregularly and variously from the central one, towards the middle of the leaf. The base of the *leaves* in the Linnæan specimen is more dilated, and visibly unequal, than in those from Sierra Leone, but we scarcely think it indicates a specific difference. The *clusters* are two inches long; partial stalks half an inch.

The species of Vahl's second section are usually of humble growth, and a shining, pellucid, succulent habit. Such is

*P. obtusifolium*. Blunt-leaved Pepper. Linn. Sp. Pl. 42. Willd. n. 31. Vahl. n. 79. Ait. n. 13. Trew Ehret. t. 96.—Leaves obovate; ribless beneath.—Native of the West Indies. The Linnæan specimen came from Jamaica. Vahl confounds with this the *chusafolium*, Jacq. Ic. Rar. t. 212, but they are kept separate in Hort. Kew. The *stem* is most spotted in *obtusifolium*: the *leaves* darker in *chusafolium*, with more conspicuous lateral ribs. These species and many others of this section, want a thorough investigation, and a careful comparison with each other, to be well understood; neither is the whole genus so completely settled as could be wished, notwithstanding the labours of Vahl, which have not extended sufficiently to the synonyms.

PIPER, in Gardening, contains plants of the herbaceous, shrubby, perennial, exotic kinds, of which the species cultivated are; the black pepper (*P. nigrum*); the rough-leaved pepper (*P. amalago*); the long pepper (*P. longum*); the intoxicating pepper, or ava (*P. methyficum*); the netted-leaved pepper (*P. reticulatum*); the hooked-spiked pepper (*P. aduncum*); the pellucid-leaved pepper (*P. pellucidum*); and the blunt-leaved pepper (*P. obtusifolium*).

On the first sort Martyn observes, that “white pepper was formerly thought to be a different species from the black; but it is nothing more than the ripe berries deprived of their skin, by steeping them about a fortnight in water; after which they are dried in the sun. The berries falling to the ground when over-ripe, lose their outer coat, and are sold as an inferior sort of white pepper.”

*Method of Culture*.—All these plants may be increased by seeds, procured fresh from the countries where the plants grow naturally, which should be sown upon a good hot-bed in the spring; and when the plants come up and are fit to transplant, be each put into a separate small pot filled with light fresh earth, and replunged into a hot-bed of tanners' bark, shading them every day from the sun till they have taken fresh root, when they must be treated in the same way as other tender exotic plants, admitting fresh air to them daily in proportion to the warmth of the season, to prevent their drawing up weak; and when the nights are cold the glasses of the hot-bed should be covered with mats.

They all require the constant protection of a hot-house.

As the stalks of most of them are tender when young, they should not have much wet, which rots them; and when water is given it must be with caution, not to beat down

down the plants; for when that is the case they seldom rise again afterwards.

In some of the forts they may be raised from layers or cuttings.

In the after-management of the plants, they must be plunged into the tan-bed of the bark-stove in the autumn, and during the winter be sparingly watered; they require the same warmth as the coffee-tree. In the summer a large share of fresh air must be admitted in hot weather, and they must be constantly kept in the stove, as already suggested.

They afford ornament and variety in stove collections.

PIPER *Chiapa*, in *Botany*, a name given by some authors to the clove-berry-tree, or cassia caryophyllata.

PIPER, *Jamaica*. See MYRTUS *Pimenta*.

PIPER *Nigrorum*, *Negro pepper*. The plant called at present by this name is the *capsicum*, or *Guinea pepper*, a remarkable herb, bearing large pods as red as coral, of which the Cayenne butter is made in America. But this is not the plant that was anciently known by this name. Avicenna and Serapion both mention a plant, which they call *fulful alfuaden*, the English of which is, the *pepper of the black people*. But this was properly what has been since called the *Ethiopian pepper*; a sort of hot seeds approaching to the nature of the common pepper, and containing several together in pods.

It is not easy, from the accounts we have left, to say what it is; but they have left description enough of it for us to say what it is not, and to find that they have all been mistaken, who have supposed it to be either the root tarfi, or the bulbous of the Arabians, which last was as large as a pear. See CAPSICUM.

PIPER *Tavasci*, the clove-berry-tree, or cassia caryophyllata; a tree whose bark is used in medicine.

PIPER, *Sand*, in *Ornithology*. See ARENARIA and TRINGA *Interpres*.

PIPER, in *Ichthyology*, the English name of a species of *trigla*, called by the generality of authors *lyra*. See TRIGLA *Lyra*.

PIPERAH, in *Geography*, a town of Hindoostan, in Bahar; 22 miles S.S.W. of Patna.

PIPERAPIUM, an old name of a plant found in Apuleius, and said to have its name from its heat to the taste; which was so offensive to the bees, that if a piece of it were hung up in the hive, it would drive them all out.

This is a very strange account: and as we meet with nothing to countenance it in any other author, there is reason to suspect it to be an error; and there seems this foundation for it. The acorus root is said by Dioscorides to be the root of a plant allied to the papyrus, or paper-reed of the river Nile; and is thence called by that author *papyraceous*. Avicenna and Serapion copy this, and liken the acorus plant to the papyrus; but in all the copies of the Greek author, it is often found written *πιπερασιον*. This word *peperacion* may have been formed by Apuleius into *piperapium*, by way of amendment, and all the rest might be occasioned by this.

PIPERI, in *Geography*, a small island in the Grecian archipelago; six miles N. of Serpho.

PIPERIDGE TREE, in *Botany*. See BERBERIS.

PIPERINO, in *Mineralogy*, a substance that seems to be a concretion of volcanic ashes, and is said to be that which covers Pompeii. Its colour, grey, or reddish-brown; its lustre and transparency, 0; its fracture earthy, contains fragments of white marble, feldspar, mica, garnets, coriæz, gypsum, thori, granite, &c.; its hardness, 6; sometimes magnetic, sometimes not.

It seems to differ from tufas, in containing more heterogeneities, being in fact a kind of porphyry or breccia, and

being more easily decomposed by exposure to moisture and the open air, but if preserved from moisture, it hardens when exposed to the air. Kirwan.

PIPERITIS, in *Botany*, a name given by some authors to the momordica, or male balsam apple.

PIPERIVORA Avis, in *Ornithology*, a name given by some authors to the toucan, or Brazilian magpye, from its feeding on pepper.

PIPERNO, in *Geography*, a town of Italy, in the Campagna di Roma, formerly the see of a bishop, but in 1225, on account of its poverty, united to Terracina. It was built out of the ruins of the ancient *Privernum*, which see; nine miles N.N.W. of Terracina.

PIPEROONE, a town of Hindoostan, in Bahar; 25 miles N. of Durbungah.

PIPERY, a town of Hindoostan, in Candeish; 32 miles S.S.E. of Chuprah.

PIPILE, in *Ornithology*, a species of *Penelope*; which see.

PIPING, in *Sea Language*. See CALL.

PIPING-Tree, in *Geography*, a town of America, in Virginia; nine miles E. of Newcastle.

PIPIRI, in *Ornithology*, a name given by Buffon to the *Lanius Tyrannus*; which see.

PIPISTRELLUS, in *Zoology*, a species of *Vespertilio*; which see.

PIPLERCHE, in *Ornithology*. See ALAUDA *Cristata*.

PIPLEY, in *Geography*, a town of Hindoostan, in Baglana; six miles N.W. of Bahbelgong.—Also, a town of Hindoostan, in the country of Berar; 18 miles N. of Jafferabad.—Also, a town of Hindoostan, in Bengal, near the borders of Orissa, on a branch of the Ganges, and formerly a place of trade, having an English and Dutch factory; but the trade declined, and the factories were removed to Hoogly and Calcutta; 22 miles N.E. of Balafore.

PIPPARAH, a town of Hindoostan, in Oude; 42 miles N.W. of Lucknow.—Also, a town of Hindoostan, in Oude; 48 miles E. of Bahraitch.

PIPPA, the *Manakin*, in *Ornithology*, a genus of birds of the order Passeres. The generic character is; bill short, strong, hard, nearly triangular at the base, and slightly incurved at the tip; the nostrils are naked, the feet formed for walking, the tail is short. These birds are very similar to the genus of Titmice, and are almost all peculiar to South America. In Gmelin there are thirty-one species enumerated; Latham mentions but twenty-five.

Species.

RUPICOLA; Rock Manakin. Crest erect, edged with purple; the body is of a saffron colour; the tail-coverts are truncate. It inhabits the rocky parts of South America, and is the size of a small pigeon. It is extremely shy, but may be tamed if taken very young; it feeds on small wild fruits, and builds in the clefts of the most remote rocks. It lays two white eggs at a time. The female, and the male also when young, are brown; the lower wing-coverts are rufous and orange.

PERUVIANA; Peruvian Manakin. Body saffron-red; greater wing-coverts cinereous; quill and tail-feathers black; the coverts of the latter are not truncate. It is a native of Peru, and of the same size as the last.

PAREOLA; Blue-backed Manakin. Crest blood-red, body black; back blue. It inhabits South America, and is four inches and a half long.

SUPERBA; Superb Manakin. Deep black; middle feathers of the crown longish, and of a flame colour; beneath the wings are pale blue lunular blotches; primary quill-feathers

feathers brownish. It is larger than the Aureola, to be noticed hereafter.

**CRISTATA**; Purple Manakin. Crest pale yellow; body purple. It inhabits Brazil and New Spain, and is three inches and a half long.

**PICICITI**; Mexican Manakin. Cinereous; head and neck black; round the eyes is a whitish spot, which ends in a point at the breast. It is very small, and found in Mexico.

**RUBETRA**; Yellow Manakin. Crest pale yellow; body testaceous; quill and tail-feathers blue. It is found in Brazil and Cayenne. The bill is yellow; the chin brown, and the neck is marked with a golden colour.

**TORQUATA**; Collared Manakin. Black; head scarlet; quill feathers and coverts blue. It inhabits Brazil, and is about three inches and a half long.

**MIACATOTOTI**; New Spain Manakin. Black, with a few whitish feathers; belly pale; wings and tail beneath cinereous.

**PUNCTATA**; Speckled Manakin. Greyish-brown, waved with dusky; top of the head and wings black, speckled with white; tail-coverts red. Found in New Holland.

**GRISEA**; Grey Manakin. Grey, beneath yellow; hind-head crested; greater wing-coverts red; quill-feathers and tail greyish; the front is marked with a yellow spot.

**ALBIFRONS**; White-faced Manakin. Crest white; body testaceous; back black. There is a variety with a rusty-testaceous body; crest is long and unequal. They are found in divers parts of South America.

**ERYTHROCEPHALA**; Gold-headed Manakin. Black; head and arm-pits tawny. There is a variety of this species which is black; the head and bracelets red.

**AUREOLA**; Red and black Manakin. Black; head and breast scarlet; quill-feathers with a white spot on the fore-part. A variety has the head, lower part of the neck, breast, belly, and edges of the wings, orange; the quill-feathers have a white spot within. It inhabits Guinea. The first has a black bill, with legs and claws red; the second has them brown.

**CAUDATA**; Long-tailed Manakin. Blue; crown scarlet; wings black; two middle tail-feathers long and pointed. It inhabits South America; the sides and neck are tinged with a bright green lustre.

**LEUCOCEPHALA**; White-headed Manakin. Black, with a white head. It is a native of Surinam, and is the size of a warbler.

**LEUCOCILLA**. Dusky-black; cap white; a variety is dusky-black; cap white; bracelets red. It is found among the reedy places of South America.

**GUTTURALIS**; White-throated Manakin. Black, throat white. It is a native of the hottest parts of South America.

**SKRENA**; White-fronted Manakin. Black; front white; rump blue; belly tawny. It is a native of Guiana and Cayenne.

**MANACUS**; Black-capped Manakin. Black, beneath white; spot on the wings and neck above white. A variety of this species is without the spot on the wings.

**MINUTA**; Little Manakin. Grey; head black, speckled with white. It inhabits India, and is the size of a wren.

**STRIATA**; Striped-head Manakin. Beneath yellowish; upper part of the head and nape black, the feathers with a white streak lengthways; the quill-feathers are black, the third very short.

**NÆVIA**; Spotted Manakin. Brown, beneath tawny; chin and throat black; breast bifid, band on the wings, and

tips of the tail-feathers white. It is about four inches long.

**LEUCOTIS**; White-eared Manakin. Varied with olive and rufous, beneath rufous; belly grey; crown brown; temples and chin black; on each side the neck is a tuft of long snowy feathers. This is nearly five inches long.

**ATRICAPILLA**; Black-crowned Manakin. Pale ash-colour, beneath grey-white; bill, crown, greater wing-coverts, and quill-feathers black, the latter edged with grey; the front and cheeks are of a grey-white. It is six inches long, and inhabits Guiana. It avoids the open plains, and haunts the skirts of woods in small flocks. The birds of this species are found in the neighbourhood of ant's nests, from which they are sometimes seen to spring as if stung by the insects, uttering, at the moment, a cry similar to the noise made by cracking a nut.

**PAPUENSIS**; Papuan Manakin. Greenish-black, beneath whitish; breast with an oblong orange blotch; middle tail-feathers very short. It is a native of New Guinea.

**HÆMORRHEA**; Crimson-vented Manakin. Deep black, beneath white, vent with a red spot.

**NIGRICOLLIS**; Black-throated Manakin. Blueish-black; throat and vent black; belly white.

**CAPENSIS**; Orange-bellied Manakin. Dusky-black, beneath pale orange; edge of the quill-feathers pale, of the wings pale yellowish-orange.

**CINEREA**; Cinereous Manakin. Cinereous; belly whitish.

**MUSICA**; Tuneful Manakin. Black, beneath orange; the front and rump yellow; the crown and nape blue; chin and throat black. This is a native of St. Domingo, and is about four inches long. It is extremely shy, and easily eludes the vigilance of those who attempt to catch it; its note is very musical, and forms a complete octave, one note succeeding another. The bill and legs are black.

**PIRA**, a name given by Aristotle, and other ancient writers, to the *picus varius major*, the great spotted woodpecker, or witwall.

**PIPRAH**, in *Geography*, a town of Hindoostan, in Vissapour; 13 miles S.E. of Poorunda.—Also, a town of Hindoostan, in Rohilcund; 17 miles S.E. of Budayoon.—Also, a town of Hindoostan, in Oude; 38 miles N.N.E. of Manickpour. N. lat. 26°. E. long. 82° 18'.

**PIPRIAC**, a town of France, in the department of the Ille and Vilaine, and chief place of a canton, in the district of Rédon; 10 miles N. of Rédon. The place contains 3150, and the canton 12,161 inhabitants, on a territory of 245 kilometres, in 9 communes.

**PIPROW**, a town of Hindoostan, in the circle of Bopal; 10 miles S. of Bopaltol.

**PIQUE**, in *Natural History*, a name given by the Spaniards to an insect of the size of a flea, called by the Indians *tung*. It is common in the East and West Indies, and eats its way into the flesh under the nails, &c.

**PIQUE**, or *Piquemontvallier*, in *Geography*, the highest mountain among the Pyrenees.

**PIQUERIA**, in *Botany*, commemorates Andrew Piquerio, a Spanish physician and philosopher, whose works have often been republished at Venice and Amsterdam, and whose merits are highly celebrated by Cavanilles, the author of the name; though without any mention of his botanical pretensions, which would have been, in this case, most to the purpose.—Cavan. Ic. v. 3. 18. Willd. Sp. Pl. v. 3. 1748. Ait. Hort. Kew. v. 4. 501. —Class and order, *Syngnesia Polygamia-aqualis*. Nat. Ord. *Composita discoidæa*, Linn. *Corymbifera*, Juss.

Gen. Ch. *Common calyx* simple, prismatic, of four or five converging, concave, keeled, equal scales. *Cor.* compound, discoid.

discoid. Florets few, all fertile, uniform, crowded; tube very short; limb in five spreading segments. *Stam.* Filaments five, very short; anthers united into a cylinder. *Pist.* Germen turbinate, with five angles; style thread-shaped; stigmas divaricated, tumid. *Seeds* solitary, minute, turbinate, with five angles, abrupt at the summit. *Crown or down* none. *Receptacle* naked.

*Eff. Ch.* Receptacle naked. Calyx with four or five equal leaves, and as many florets. Seeds five-angled. Down none.

1. *P. trinervis.* Three-ribbed Piqueria. Cavan. Ic. v. 3. 19. t. 235.—Leaves ovato-lanceolate, serrated, three-ribbed. Panicle smooth.—Native of Mexico. Seeds were brought from Spain to England in 1798, by the marchioness of Bute. The plant is biennial, flowering in the greenhouse in July and August. The stems are herbaceous, four feet high, round, leafy, with opposite branches, panicle and many-flowered. Leaves opposite, on short stalks, smooth, like every other part of the plant. Flowers very small and numerous, white, on capillary, panicle, terminal stalks. Leaves of the calyx four, obovate. Florets four.

2. *P. pubescens.* Rough Piqueria.—Leaves dilated, three-lobed, cut. Panicle corymbose, downy.—Native of Peru. A specimen of this, without any name or mark, was found in the herbarium of the younger Linnæus, amongst a number of Peruvian plants. Its stem seems rather shrubby, with opposite, round, leafy branches, clothed with fine, short, dense, rusty, rigid down. Leaves fan-shaped, acute, nearly smooth, variously cut, and more or less regularly three-lobed, an inch or more in length, on rough stalks about half as long. Panicle terminal, corymbose, dense, many-flowered. Calyx-leaves five, narrower than in the former. Florets about five. In other respects this plant answers to the generic character given of the former by Cavanilles. This genus ranges next to *ETHULIA*; see that article.

**PIQUET.** See **PICKET.**

**PIQUETTE**, among the *Florists*, a term used for a certain sort of carnations, which have always a white ground, and are spotted, or, as they call it, pounced with scarlet, red, purple, or other colours.

**PIQUICA**, in *Geography*, a town of Peru, in the diocese of La Plata, on the coast of the Pacific ocean; 85 miles S.W. of Atacames. S. lat. 27°.

**PIQUITINGA**, in *Ichthyology*, the name of a small American fish, the *Esox Hepsetus*, which see. It seldom exceeds two inches in length; its mouth appears very small, but it can at pleasure open it to a great width; its eyes are very large and black, with a silvery iris; it has six fins besides the tail, which is forked; its head is of a silvery white; its back olive-colour, and its belly and sides are covered with silvery scales; the fins are all white, and the side-lines are broad, and very bright and shining. *Marcgrave.*

**PIRA**, in *Geography*, a town of Austria; six miles S.S.E. of St. Polten.

**PIRA-Aca**, in *Ichthyology*, a name by which *Marcgrave* and some other authors have called the *BALISTES Sinenfis* of others.

**PIRA-Angata**, the name of a Brazilian fish, resembling the perch in size and shape. It is of a small size, seldom exceeding four or five inches in length; its mouth is small; its tail is forked; and it has on the back only one long fin, which is supported by rigid and prickly spines; this it can depress at pleasure, and sink within a cavity made for it in the back; its scales are of a silvery white. It is a wholesome and well-tasted fish. *Marcgrave.*

**PIRA-Coaba**, the name of an American fish of the trutta-

ceous kind, much esteemed for the delicacy of its flavour. It grows to about twelve inches in length; its nose is pointed, and its mouth large, but without teeth; the upper jaw is longer than the other, and hangs over it in form of a cartilaginous prominence; its eyes are very large, and its tail forked; under each of the gill-fins it has a beard made of six white filaments, and is covered all over with silvery scales. *Marcgrave.*

**PIRA-Guiba.** See *ECHINEIS Naucrates.*

**PIRA-Jurumenbeca**, the name of a Brazilian fish, called by many the *bocca molle*. It lives in the muddy bottom of the American seas, and it is a long-bodied not flattened fish; it grows to a vast size, being sometimes caught of nine, and sometimes even of ten or eleven feet long, and two feet and a half thick; it has one long fin on the back, the anterior part of which is thin and pellucid; and has a cavity on the back, into which the creature can depress the fin at pleasure; its tail is not forked; its scales are all of a silvery colour and brightness. It is a very well-tasted fish. *Marcgrave.*

**PIRA-Metara**, a name given by *Marcgrave* and others to a variety of the *MULLUS Surmuletus.*

**PIRA-Pebe**, the name given by *Marcgrave* to the *TRIGLA Volitans*; which see.

**PIRA-Pixanga**, the name of a Brazilian fish of the turdus or wrasse kind, and called by some the *garvisch*. Its usual length is four or five inches; its mouth is considerably large, and furnished with very small and sharp teeth; its head is small, but its eyes large and prominent; the pupil of a fine turquoise colour, and the iris yellow and red in various shades; the coverings of the gills end in a triangular figure, and are terminated by a short spine or prickle; its scales are very small, and so evenly arranged, and closely laid on the flesh, that it is very smooth to the touch; its tail is not forked, but rounded at the end; its whole body, head, tail, and fins, are of a pale yellow, variegated all over with very beautiful blood-coloured spots; these are round, and of the bigness of hemp-seed on the back and sides, and something larger on the belly; the fins are also spotted in the same manner, and are all marked with an edge of red. It is caught among the rocks, and about the shores, and is a very well-tasted fish. *Marcgrave.*

**PIRÆUS**, or **PYRÆUS**, in *Ancient Geography*, a celebrated and capacious harbour of Athens, about 35 or 40 stadia from the city, but joined to it by walls about five miles in length; that on the north was built by Pericles, and that on the south by Themistocles. This was made the port of Athens by the latter commander, who observing that the ancient port of Phalerum was narrow and inconvenient, constructed the Piræus, which he made the most capacious haven in Greece, and conceiving it inexpedient that the port should be made a part of the city, because, as he knew that sailors are generally dissolute, he was afraid their mixing with the citizens would produce a corruption of manners, he built it at a distance, and connected it with the city by long walls. The site of this port was originally a village of Attica; and in order to render it secure it was encompassed by strong walls. The whole of its circuit was 60 stadia, including the "Munychia," which was a promontory near it, and which being naturally very strong, was rendered still stronger by artificial fortification. On the walls that joined the Piræus with the city, were erected turrets, which were afterwards converted into dwelling-houses for the accommodation of the Athenians, whose large city became in process of time too small for them. It was after the battle of Salamis, which happened in the first year of the 75th olympiad, 480 years B.C., and

by which Athens was elevated to a very high degree of glory, that Themistocles projected the scheme of constructing this new harbour. Accordingly in the last year of the 75th olympiad, 477 years B.C., he explained to the citizens the plan which he had conceived for establishing their power and increasing their wealth. In order the more effectually to secure their concurrence, after stating the advantages that would result to them from the execution of his plan, he requested them to appoint two persons of rank and talents, to whom he might freely communicate the whole of his project. The assembly of the citizens appointed Aristides and Xanthippus, to whom Themistocles imparted, without reserve, his scheme of rendering the Piræus a safe and capacious harbour. To these he demonstrated how easily his scheme might be accomplished, if his intentions were kept secret, and at the same time informed them how dangerous it would be for the Spartans to be apprised of his design. Aristides and Xanthippus assured the people, that the project of Themistocles was of the utmost advantage to the state, and yet that it might be performed with the greatest ease. Nevertheless the people entertained suspicions of some sinister designs, and recommended Themistocles's application to the senate, who having obtained their consent sent ambassadors to Sparta, intimating how fit it would be for the Greeks to have some great port, where a fleet might continue in safety, to watch the designs of the Persians. Having thus prepared the Lacedæmonians not to take offence at their first preparations for enlarging and establishing the harbour of Piræus, Themistocles took such care that every thing was finished, and the place in a posture of defence, before it was well known in Sparta what the Athenians were about.

The entrance of the Piræus is narrow, and formed by two rocky points, one belonging to the promontory of Eëtion and the other to that of Alcinous. Within were three docks or stations for shipping, Cantharos, Aphrodisium, and Zea; the first so called from an ancient hero, the second from the goddess Venus, who had there two temples, and the third from bread-corn. In this port were also five porticos, which, joining together, formed one great arcade, called "Macra Stoa," or the grand portico. There were likewise two large markets or fora, one near the long portico, and one near the city. The walls were formed of hewn square stones, and united without cement, merely by lead and iron, which served to hold together the exterior ranges or facings. They were so wide that loaded carts might pass upon it in different directions, and their height was about 40 cubits. These long walls were repaired by Conon, destroyed almost wholly by Lyfander, the Lacedæmonian, and partly reconstructed by Conon, and perfected by Callicrates, during the government of Pericles.

The Piræus, as long as Athens flourished, became the emporium of all Greece. The architect was Hippodamus celebrated for the construction of other buildings.

At the Piræus were a theatre, a temple, or chapel, in which were two statues, one of Jupiter with a sceptre in his hand, and one of Minerva with a pike, and others of Venus, &c. The cavities and windings of the Munychia, both natural and artificial, were filled with houses; and the whole settlement comprehending Phalerum and the ports of the Piræus, with the arsenals, the store-houses, the famous armoury of which Philo was the architect, and the sheds for 300, and afterwards 400, triremes, resembled the city of Rhodes, which had been planned by the same Hippodamus. The ports, on the commencement of the Peloponnesian war, were secured with chains, centinels were stationed, and the Piræus was carefully guarded.

It was with great difficulty that the Piræus was reduced by Sylla, who demolished the walls, and set fire to the armoury and arsenals. In the civil war it was in a defenceless condition. Calenus, lieutenant to Cæsar, seized it, invested Athens, and ravaged the territory. Strabo, who lived under the emperors Augustus and Tiberius, observes, that by many wars the long walls had been destroyed, together with the fortrefs of Munychia, and that the Piræus had been contracted into a small settlement by the ports and the temple of Jupiter the Saviour. This fabric was then adorned on the inside with pictures, the works of illustrious artists, and on the outside with statues. In the second century, besides houses for triremes, the temples of Jupiter and Minerva remained, with their images in brass, and a temple of Venus, a portico and the tomb of Themistocles, whose bones were conveyed hither by his friends from Magnesia.

The port of the Piræus has been named "Porto Leone," from its marble lion, and also "Porto Draco." The lion has been described as a piece of admirable sculpture, ten feet high, and reposing on its hinder parts. Near Athens, in the way to Eleufis, was another, in a couchant posture, probably the companion of the former. Both these were removed to Venice by the famous general Morosini, and placed before the arsenal. At the mouth of the port are two ruined piers. It is frequented by a few vessels, which are, for the most part, small craft. The buildings are a mean custom-house, with a few sheds, and by the shore, on the east side, a warehouse belonging to the French and a Greek monastery dedicated to St. Spiridion. On the opposite side is a rocky ridge, on which are remains of the ancient wall and of a gateway towards Athens. By the water-edge are vestiges of building; and between the custom-house and the city on the right hand of the road are traces of a small theatre on the side of the hill of Munychia.

PIRAGUIRI, in *Geography*, a town of Brasil, in the government of Para, on the Xingi; 85 miles S.W. of Curupa.

PIRANHA, in *Ichthyology*, a name given to the American fish, more commonly known by the name piraya.

PIRANO, in *Geography*, a sea-port town of Istria, situated partly on an eminence, and partly on an isthmus; nine miles S.W. of Capo d'Istria. N. lat. 45° 37'. E. long. 13° 36'.

PIRAQUIBA, or IPIRAQUIBA, in *Ichthyology*, a name originally Brazilian, by which some authors express the *renora*, or sucking-fish.

PIRATE, PYRATE, *Pirata*, *Rover*, a person, or vessel, that robs on the high seas, or makes descents on the coasts, without the permission or authority of any prince or state.

The colours usually displayed by pirates are said to be a black field, with a death's head, a battle-axe, and an hour-glass.

By the ancient common law, piracy, if committed by a subject, was held to be a species of treason, and by an alien to be felony only; but now, since the statute of treasons, 25 Edw. III. cap. 2. it is held to be only felony in a subject. Formerly it was only cognizable by the admiralty courts, which proceed by the rules of the civil law; but the statute 28 Hen. VIII. cap. 15. established a new jurisdiction for this purpose, which proceeds according to the course of the common law. The offence of piracy, by common law, consists in committing those acts of robbery and depredation upon the high seas, which, if committed upon land, would have amounted to felony. But,

by

by statute, some other offences are made piracy also; as by 11 & 12 W. III. cap. 7. if any natural born subject commits any act of hostility upon the high seas, against others of his majesty's subjects, under colour of a commission from any foreign power, this, which would be only an act of war in an alien, shall be construed piracy in a subject. And farther, any commander, or other sea-faring person, betraying his trust, and running away with any ship, boat, ordnance, ammunition, or goods, or yielding them up voluntarily to a pirate, or conspiring to do these acts; or any person confining the commander of a vessel, to hinder him from fighting in defence of his ship, or to cause a revolt on board, shall, for each of these offences, be adjudged a pirate, felon, and robber, and shall suffer death, whether he be a principal or accessory. By 8 Geo. I. cap. 24. the trading with known pirates, or furnishing them with stores or ammunition, or fitting out any vessel for that purpose, or in anywise consulting, combining, confederating, or corresponding with them; or the forcibly boarding any merchant vessel, though without seizing or carrying her off, and destroying or throwing any of the goods overboard, shall be deemed piracy; and all accessories to piracy are declared to be principal pirates and felons, without benefit of clergy. Commanders or seamen wounded, and the widows of such as are slain, in any piratical engagement, shall be entitled to a bounty, to be divided among them, not exceeding one-fiftieth part of the value of the cargo on board; and such wounded seamen shall be entitled to the pension of Greenwich hospital. And if the commander shall behave cowardly, by not defending the ship, if she carries guns or arms, or shall discharge the mariners for fighting, so that the ship falls into the hands of pirates, such commander shall forfeit all his wages, and suffer six months' imprisonment.

In different parts pirates are differently denominated; as in the West Indies, *buccaneers*, *free-booters*, &c. In the Mediterranean, *corsairs*, &c.

Alexander, reproaching a pirate with his condition, was answered, "If I am a pirate, it is because I have only a single vessel; had I a fleet, I should be a mighty conqueror."

PIRATE was also anciently used for the person to whose care the mole, or pier of a haven, which, in Latin, was called *pira*, was entrusted.

PIRATE was sometimes too, according to Spelman, used for a sea-captain, or soldier. Afler, in the life of king Alfred, tells us, "justit naves longas fabricari, impositisque piratis in illis vias maris custodiendas commisit."

PIRATIAPIA, in *Ichthyology*, the name of a Brazilian fish, approaching to the nature of the turdus or wrasse. Its body is oblong, not flattened, and very thick; it is a large fish, and sometimes grows even to fifty pounds weight. It is a very delicate and valuable fish. Marcgrave.

PIRATIA-PUA, the name of an American sea-fish, which grows to a very large size, and, while young, is eaten and accounted a delicacy; but when full grown, is too coarse, rank, and strong: it has six fins besides the tail, which is made of a very large fin, of a somewhat square figure, and is not at all forked: it is all over of a dusky orange colour, but more obscurely so on the back than elsewhere; and its sides are variegated with grey spots, so disposed as to represent a sort of net-work. Pifo.

PIRAUGY, in *Geography*, a river of Brazil, S.S.E. of Rio Grande and Point Negro.

PIRAUMBU, in *Ichthyology*, the name of a Brazilian fish, somewhat approaching to the nature of the turdus, and called by the Portuguese *chayquarona*. It is of the figure of the carp, and its usual length is six or seven inches, and its breadth in the broadest part about three inches, but gra-

dually diminishing to the tail. It is caught among the rocks, and near shores, and is a well tasted fish. Marcgrave.

PIRAY, in *Geography*, a river which runs into the Paraguay.

PIRAYA, a town of Paraguay; 20 miles S.E. of Assumption.

PIRAYA, in *Ichthyology*, the name of a fish caught in the American rivers. There are two kinds of it: the one growing to a foot long, and very broad in proportion; this loves the muddy bottoms of rivers; the other is much of the same size, but has two fins on its back, whereas the other has but one; this loves the sandy bottoms of rivers. There is also a smaller species of this: all three are eatable fish.

PIRAZZETA, in *Geography*, a town of Naples, in Basilicata; 14 miles N.E. of Turfi.

PIRDE, a river of Prussia, which runs into the Memel, four miles W. of Tiltit.

PIRETIBBI, a lake of Canada, 240 miles N. of Quebec. N. lat. 51°. E. long. 69° 40'.

PIRGIA, a town of Asiatic Turkey, in Caramania; 112 miles S.W. of Cogni.

PIRGO, a town of Albania, at the mouth of the river Polonia; 20 miles N. of Valona.

PIRHALA, a town of Hindoostan, in Lahore; 108 miles N.W. of Lahore. N. lat. 32° 36'. E. long. 71° 56'.

PIRI, a province of Africa, in the N. part of the kingdom of Loango.

PIRIATIN, a town of Russia, in the government of Kiev; 68 miles E.S.E. of Kiev. N. lat. 51° 18'. E. long. 32° 42'.

PIRIG, a town on the S. coast of the island of Luçon. N. lat. 13° 39'. E. long. 122° 24'.

PIRIGARA, in *Botany*, Aubl. Guian. t. 192, 193. See GUSTAVIA.

PIRIN'S ISLAND, in *Geography*, an island near the coast of Africa, in the mouth of the river Olibato; eastward of cape Lopez Gonsalvo, about five miles in circumference.

PIRIOUTI, a town of Thibet; 60 miles E. of Panc-tou.

PIRIPEA, in *Botany*, an unexplained, probably barbarous, name. Aubl. Guian. v. 2. 627. Juss. 100.—Class and order, *Didynamia Angiospermia*. Nat. Ord. *Personate*, Linn. *Pediculares*, Juss.

Gen. Ch. Cal. Perianth inferior, of one leaf, tubular, its orifice in five unequal acute segments. Cor. of one petal, salver-shaped; tube cylindrical, curved, twice the length of the calyx; limb spreading, in five deep, unequal, obovate segments; mouth closed with oblong glands. Stam. Filaments four, thread-shaped, inserted into the middle of the tube, two of them longer than the rest, all enclosed within the tube; anthers erect, oblong, of two cells. Pist. Germen superior, oblong, quadrangular; style short; stigma swelling, acute. Peric. Capsule oblong, compressed, of two cells, and two valves. Seeds numerous, minute, inserted into the partition.

Ess. Ch. Calyx tubular, with five unequal teeth. Corolla salver-shaped, curved; limb in five obovate, unequal segments; mouth closed with glands. Capsule of two cells. Seeds numerous, minute.

1. *P. palustris*. Aubl. Guian. t. 253.—Native of the meadows of Courou in Guiana, flowering and ripening fruit in September.—Root small, fibrous, apparently annual. Stem a foot high, erect, slender, leafy, striated, somewhat branched. Leaves scattered, sessile, linear, acute, very narrow, channelled, finely toothed, smooth. Flowers in loose, terminal, simple spikes. Bractees three, fringed, at the base

of each flower. *Flowers* hardly an inch long, purplish; the glands at the mouth white. A pretty delicate plant, thought by Jussieu to constitute a distinct genus, akin to *Erinus*, *Buchnera*, *Manulea*, *Bartisia*, &c. We have seen no specimen. Swartz cites it as a synonym to his *Buchnera elongata*. See BUCHNERA.

PIRIQUETA, Aubl. Guian. t. 117. See TURNERA.

PIRIT, in *Ornithology*, a name given by the people of the Philippine islands to a peculiar species of sparrow, which is very common with them. It is much smaller than our common sparrow, and feeds only on the seeds of the canary-grass, which is very commonly wild there.

PIRITU, in *Geography*, a small island in the Caribbean sea, near the coast of South America. N. lat.  $10^{\circ} 10'$ . W. long.  $65^{\circ} 26'$ .

PIRITZ, a town of Hinder Pomerania, which was the first town of the country that embraced Christianity, and also the doctrines of Luther; 32 miles N. of Custrin. N. lat.  $53^{\circ} 13'$ . E. long.  $15^{\circ} 4'$ .

PIRLIPO, a town of European Turkey, in Macedonia; 20 miles N.N.E. of Toli.

PIRMAKAN, a town of Bengal; 15 miles S.W. of Purneah.

PIRMASENS, a town of France, in the department of Mont Tonnerre, and chief place of a canton, in the district of Deux-Ponts; 12 miles S.E. of Deux-Ponts. The place contains 3205, and the canton 8147 inhabitants, in 21 communes.

PIRNA, a town of Saxony, in the margraviate of Meissen, advantageously situated on the Elbe for commerce; 11 miles S.E. of Dresden. N. lat.  $50^{\circ} 58'$ . E. long.  $13^{\circ} 56'$ .

PIRNITZ, or BOTNITZ, a town of Moravia, in the circle of Iglau; 10 miles S.E. of Iglau.

PIROGUIS, a name given by the Americans to their war-boats, which were a sort of canoes, so large as to carry 40 or 50 men.

PIROM, or TUICCE, an island in the Red sea. N. lat.  $15^{\circ}$ . E. long.  $42^{\circ} 40'$ .

PIROMALLI, PAUL, in *Biography*, an Italian Dominican, who flourished in the 16th century, and whose labours have greatly contributed towards the promotion of Oriental literature, was a native of Calabria. He was sent as a missionary into the East, and was said to have converted great numbers of the Eutychians to the Catholic faith. From Armenia he passed into Georgia and Persia, and upon his return into Italy by sea, he was taken and carried captive to Tunis. Being ransomed, he went to Rome, where he gave an account of his mission, and received marks of favour from pope Urban VIII. By this pontiff he was sent into Poland, with the character of papal nuncio, and is said to have been very successful in restoring union and harmony among the sects in that country. The same pope employed him in revising the Armenian version of the bible; and afterwards sent him a second time into the East, where, in 1655, he was promoted to the bishopric of Nackifivan, in Armenia. Over this see he presided nine years, and then returned to Italy, where he was nominated bishop of Bisignano, in Calabria. Here he died in 1667. He was author of a "Latin and Persian Dictionary;" "An Armenian and Latin Dictionary;" "A Grammar of the Armenian Tongue;" and some treatises in controversial divinity.

PIRON, ALEXIS, a poet and man of wit, was born at Dijon in 1689. He passed the first twenty-five years of his life in obscurity, remote from decent company, and devoted very much to low pleasures. A licentious ode, of which

he was the author, obliged him to quit Paris, where, for some years, he had supported himself by the mechanical labours of his pen as a copying clerk. His first literary efforts were as a writer for the comic opera, in which inferior station he displayed talents that recommended him to the directors of the Theatre François. His first effort, entitled "Les Fils ingrats," afterwards changed into "L'Ecole des Pères," was not at all successful. He next tried his powers in tragedy, and produced his "Callisthenes," and his "Cortes," neither of which has kept a place on the stage, though containing parts strongly written. His "Gustave" was more successful, though critics thought it too much overcharged with business; at length, in 1738, he presented his comedy of "La Metromanie," which raised him to the height of reputation. He also wrote "Les Courses de Tempe," an ingenious pastoral; several odes, poems, tales, and epigrams. In this last kind of composition he was particularly happy, as might be expected, considering that he was the most famous for repartees and bon mots of any of the Parisian wits. Of these several are given in the General Biography. He frequently made caustic remarks upon the French Academy, and afterwards exerted himself to obtain admission into it, but was excluded by means of the abbé d'Olivet, who revived the memory of his juvenile ode, for which officiousness he was recompensed by a severe epigram. Piron never forgave the Academy for their rejection of him, and composed the following epitaph:

"Ci git Piron, qui ne fut rien,  
Pas même academicien."

He died at the advanced age of 83, having been long regarded as a very estimable character. His works were published collectively in seven volumes.

PIROS, in *Geography*, a jurisdiction of Peru, on the sides of the Maragnon; 160 miles N.N.E. of Lima.

PIROT, a town of European Turkey, in Bulgaria; 40 miles N.W. of Sophia.

PIROTE, a town of Hindoostan, in Malwa; 21 miles N.W. of Chanderee.

PIROUETTE, or PYROUET, in the *Manege*, a turn or circumvolution which a horse makes, without changing his ground; his haunches remaining firm in the centre, and his shoulders furnishing and describing the circle. In this action the inner hind leg must not be lifted from the ground, but turned round in the same place, like a pivot: while the other three legs and the body of the horse turn and wheel round it at the same time.

The word is French, and literally signifies a whirligig.

Pirouettes are either of *one tread*, or *pisle*, or of *two*. The first is an entire short turn, which the horse makes upon one tread, and, almost, in one time; in such a manner as that his head comes to the place where his tail was, without putting out his haunches. In the pirouette of *two treads*, or *pisles*, he takes a small compass of ground, almost his length, and marks both with the fore part and the hind.

PIRRAWARTH, in *Geography*, a town of Austria; 14 miles N.N.E. of Vienna.

PIRUZABAD, a town of Persia, in Mecran; 30 miles S.S.E. of Kieh.

PISA, in *Ancient Geography*, a town of the Peloponnesus, in that part of the Elide called Triphylia, N. of Olympia, and, according to Herodotus, 1485 stadia distant from Athens. It was situated on the right of the river Alpheus, and even after its destruction the inhabitants of this district bore the name of Pisantins; and here was also a fountain called "Pifa." The inhabitants of this town, founded, as it is said, by one of the grandsons of Eolus, were for a long time

## PISA.

time the most powerful people of the Elide. Pausanias says, that vines covered the site of Pisa.

PISA, in *Geography*, a city of Etruria, and capital of a territory, stands in a fertile plain, bounded by the neighbouring Apennines on the N., and on the S. open to the Tyrrhenian sea. If we may rely on the authority of Strabo, we may trace the origin of Pisa to the period that followed the Trojan war, and thus connect its history with the fate of the Grecian chiefs, and particularly with the wanderings of the venerable Nestor. At all events the

“Alpheæ ab origine Pifæ  
Urbs Etrufca folo,”

enjoys the double glory of being one of the most ancient cities of Etruria, and of deriving its name and its origin from the Olympic Pifa, on the banks of the Alpheus. Although this city was always considerable, as forming one of the Etruscan tribes, or afterwards honoured with a Roman colony, A. U. C. 474; yet it did not arrive at the zenith of its fame till the records of ancient times were closed, and the genius of Rome and liberty seemed for ever buried under the ruins and barbarism of the middle ages. At that period, apparently so unpropitious, the flame burst forth, and again kindled the slumbering spirit of Italian freedom. Pisa was not the last that roused itself to activity; it asserted its independence at an early period, and in the 10th century blazed forth in all the glory of a mighty and victorious republic. Its numerous fleets rode triumphant on the Mediterranean; and Corsica and Sardinia, the Saracens on the coast of Africa, and the infidel sovereign of Carthage, bowed beneath its power. Captive kings appeared before its senate; the Franks in Palestine and in Egypt owed their safety to its prowess, and Naples and Palermo saw its flags unfurled on their towers. Pontiffs and emperors courted its alliance, and acknowledged its effective services, and the glory of Pisa, twenty centuries after its foundation, eclipsed the fame of its Grecian parent, and indeed rivalled the achievements of Sparta herself, and of all the cities of Peloponnesus united. During this era of glory, commerce, as well as conquest, introduced opulence and splendour into the city; its walls were extended and strengthened; its streets widened and adorned with palaces, and its churches rebuilt in a style of magnificence, that even now astonishes the traveller, and attests the former fortunes of Pisa. A population of 150,000 inhabitants filled its vast precincts with life and animation, and spread fertility and riches over its whole territory. Such was its state during the 11th, 12th, and great part of the 13th centuries, after which the usurpation of domestic tyrants first, and next the victories of the Genoese, broke the spirit of its citizens. Then the treachery of its princes, with the interference and deceitful politics of France, undermined its freedom, and at length the intrigues of the Medici completed its ruin, and enslaved it to its rival Florence, about the year 1228. While the neighbouring Lucca, not so glorious but more fortunate than Pisa, still retains its opulence and its population. The latter, enslaved and impoverished, can count only 15,000 inhabitants within the whole circumference of her walls:—a number which, in the days of her prosperity, would have been insufficient to man one-half of her galleys, or guard her ramparts during the watches of the night.

Pisa covers an inclosure of near seven miles in circumference; the river divides it into two, nearly equal, parts; the quays on both sides are wide, lined with edifices in general stately and handsome, and united by three bridges, the middle one of which is of marble. The streets are wide, particularly well paved with raised flags for foot passengers, and the

houses are lofty, and of good appearance. Here are several palaces, not deficient either in style or magnificence. Among its churches, there is a singular edifice on the banks of the Arno, called “Santa Maria della Spina,” supposed to have been built A. D. 1230, and repaired A. D. 1300. So called from part of our Saviour’s crown of thorns said to be preserved there, square, low, and of a grotesque and whimsical, rather than beautiful appearance. It is faced with black and white marble. This building is a specimen of that species of architecture which the Italians call “Gotico Morefco,” introduced into Italy in the 11th century, and, as its name seems to import, probably borrowed from the East by the merchants of the commercial republics. We shall here observe, that there are in Italy two species of Gothic, the “Gotico Morefco,” and the “Gotico Tedefco;” the former may have been imported from the East; the latter seems, as its name implies, to have been borrowed from the Germans. It is thought to be an improvement of the former.

The finest group of buildings of the above description, perhaps, in the world, is that which Pisa presents to the contemplation of the traveller in her cathedral, and its attendant edifices, the baptistry, the belfry, and the cemetery. The cathedral is the grandest, as it is the most ancient; it was begun in the middle, and finished before the end of the 11th century. We shall restrict ourselves to a description of the campanile or belfry, which is the celebrated leaning tower of Pisa. It stands at the end of the cathedral, opposite to the baptistry, and consists of eight stories, formed of arches supported by pillars, and divided by cornices. The elevation of the whole is about 180 feet. The form and proportion of this tower are graceful, and its materials, being of the finest marble, add to its beauty; but its grand distinction, which alone gives it so much celebrity, is a defect which disparages the work, though it may enhance the skill of the architect, and by its novelty forcibly arrest the attention; we allude to its inclination, which exceeds fourteen feet from the perpendicular. Many ascribe this architectural phenomenon to design, and this is now the generally received opinion. The quantity of marble contained in the four immense edifices above-mentioned, and the number of pillars employed in their decoration, are truly astonishing. It does not appear that they belonged to any edifices in this city or its vicinity. They may have been imported by the Pisan galleys in their triumphant returns from Majorca, Sardinia, Corsica, Carthage, Sicily, and Naples, and may perhaps be considered rather as monuments of the victories of this once powerful republic, than as remains of its municipal magnificence under the Romans. Although the style of this group of edifices has been called Gothic, it is, in fact, a composite style formed of Roman orders, corrupted and intermingled with Saracenic decorations. Pisa has several other churches, besides the cathedral, that are magnificent and much admired. Its baths are about four miles from the city, and spring up at the foot of “Monte St. Giuliano;” they were frequented anciently, perhaps, more than at present. The remains of an ancient aqueduct may be seen at a little distance, but they are eclipsed by a modern one of 1000 arches, erected originally in order to supply Pisa, and now carried on to Leghorn. The university of Pisa was one of the nurseries of reviving literature, and under the auspices of republican liberty, rivalled the most celebrated academies in Italy, when they all teemed with genius and science. Upon the subjugation of Pisa to the Florentines, it sunk into insignificance; but it was afterwards restored by Lorenzo de Medici: it again declined, and was restored by  
the

the grand duke Cosmo I. Since that period it has continued the feat of many eminent professors, though it has never regained the number of its students, or all its ancient celebrity. It has more than forty public professors, who are resident, and men of high reputation in their respective departments. It is well furnished with all the apparatus of an academy;—colleges, libraries, an observatory, with all the astronomical instruments in great perfection, and an extensive, well-ordered botanical garden. Pisa is, indeed, the feat of Tuscan education, and frequented by the subjects of the Florentine government.

Pisa is only four miles from the sea; its port was anciently at the mouth of the Arno, and a place of some fame and resort. It thus gave its name to a bay which extended from the promontory of Populonia, now Piombino, to that of Luna or of Venus, Porto de Venere, and was called the "Sinus Pisanus." According to Strabo, the Ausar flowed into the Arno at Pisa, though it now falls into the sea at the distance of at least ten miles from it. Pisa and Leghorn are connected by a canal, 16 Italian miles in length; 42 miles W. of Florence. N. lat. 43° 42'. E. long. 10° 15'.

PISAN, IKAN, in *Ichthyology*. See CENTRISCUS *Scutatus*.

PISANG, in *Geography*. See PULO Pisang.

PISANIA, called also *Kuttijar Factory*, a town of Africa, in the kingdom of Yani, situated on the banks of the river Gambia, about 200 miles from its mouth, where the English have established a factory. N. lat. 13° 35'. W. long. 13° 28'. This was the outset of Mr. Park's journey for discoveries in Africa, under the direction of the African Association, and the residence of Dr. Laidley, who deserves mention on account of his kind and hospitable treatment of the adventurous traveller, whom he received into his house, and attended for many weeks during a serious illness; and whom he furnished with every necessary for his journey, when he was disappointed of the goods requisite for his expenses, taking bills upon the Association for the amount. From Pisania, Mr. Park proceeded eastward to Medina, the capital of Wolli, and thence to the E.N.E. through the countries of Bondou, Kajaaga, and Kasson, the two latter of which are separated by the river Senegal. In his way, he took observations of latitude at Kolor (N. lat. 13° 49'), Koorkoorany (13° 53'), and Joag (14° 25'). W. long. 9° 37'), on this side the river. From Joag he proceeded to Kooniakarry (14° 34'), and from Kooniakarry by Kanjee (14° 10'), both in the country of Kasson, and Fessurah (14° 5') in Kaarta, to Jarra (15° 5', long. 7° 13'), in the country of Ludamar. Here he was plundered of his sextant, which accident of course put an end to his observations of latitude; and thus, unfortunately, left the remaining half (very nearly) of his geography in a state of uncertainty as to parallel. Mr. Park pursued his journey from Jarra by Wassiboo (14° 49', and 95 geographical miles E. of Jarra), Diggani (lat. 14° 17', and 266.1 geographical miles E. of Jarra), to Segó, the capital town of Bambara (lat. 14° 10' 30", and long. 2° 26' W. of Greenwich.) Having at length reached the banks of the long sought for river Niger (or Joliba), near which the city of Tombuctoo stands, Mr. Park proceeded along it several days' journey towards this city, on a course, which places Silla, the extreme point of his expedition, in lat. 14° 48', and long. by reckoning corrected 1° 24' W. of Greenwich. Here then terminates his journey eastward, at a point somewhat more than 16° E. of Cape Verd, and precisely in the same parallel. Jinné, a large town, lies two short journeys below Silla and Tombuctoo, twelve still lower down; and it would appear that all the

journeys were conceived to be short, as Mr. Park allows only 200 geographical miles for the aggregate of the fourteen journeys of the caravan. (See *TOMBUCTOO*.) For other particulars we refer to Proceedings of the Association for promoting the Discovery of the Interior Parts of Africa; containing an abstract of Mr. Park's Account of his Travels and Discoveries, abridged from his own Minutes, by Bryan Edwards, esq.—Also, *Geographical Illustrations of Mr. Park's journey, and of North Africa at large*, by Major Rennell, 1798.

PISAQUA, a town of Peru, in the diocese of Arequipa, on the coast; 40 miles S. of Arica.

PISATELLO, a river of Italy, which rises in the department of the Rubicon or Rouagna, and being joined by two other streams, runs into the Adriatic, between Rimini and Cervia. See RUBICON.

PISCA PIGNATARÀ, a town of Naples, in the county of Molise; 15 miles N.W. of Molise.

PISCADORE ISLANDS, a cluster of islands in the North Pacific ocean. N. lat. 11° to 11° 20'. W. long. 192° 30' to 193°.

PISCADORES, or FISHERS, two huge rocks on the coast of Peru, near the broken gap between Attico and Oeona. S. lat. 16° 48'.

PISCADORES. See PONG-HU.

PISCADORES, six rocks near the coast of Peru; 5 leagues N.N.W. of Callao. S. lat. 12° 14'.

PISCARY, PISCARA, in our *Ancient Statutes*, the liberty of fishing in another man's waters.

This differs from a free fishery, which is an exclusive right: in this last the man has a property in the fish before they are caught; in a common of piscary, not till afterwards.

PISCATAQUA, or PASCATAQUA, in *Geography*, the only large river whose course is in New Hampshire, rising in a pond in the N.E. corner of the town of Wakefield, and pursuing a general S.S.E. course of about 40 miles to the sea. It divides New Hampshire from York county, Maine, and is called Salmon Fall river from its head to the lower Falls at Berwick, where it assumes the name of Newichawannock, which it bears till it meets with Cocheco river, which comes from Dover, when both run together in one channel to Hilton's Point, where the western branch meets it; from this junction to the sea the river is so rapid, that it never freezes. At the lower falls in the several branches of the river are landing places, whence lumber and other country produce are transported, and vessels and boats from below discharge their lading. This river, by its form, and the situation of its branches, is very favourable to the purposes of navigation and commerce. A light-house stands at the entrance of Piscataqua harbour, in N. lat. 43° 41', and long. 70° 41'.

PISCATAWAY, a township of New Jersey, in Middlesex county, on Rariton river, six miles from its mouth. In 1810 it had 2475 inhabitants; three miles and a half N.E. of New Brunswick.—Also, a small post-town of Prince George's county, Maryland, on the creek of its name which runs W. into Patowmack river, opposite to mount Vernon in Virginia, and 14 miles S. of Washington. The town is 16 miles S.W. of Upper Marlborough.

PISCES, in *Astronomy*, the twelfth sign, or constellation of the zodiac.

The stars in Pisces, in Ptolemy's Catalogue, are 38; in Tycho's, 36; in Hevelius's, 39; in the Britannic Catalogue, 113. See CONSTELLATION.

PISCES, in *Natural History*, is the name of the fourth of the classes into which Linnæus has distributed the animal kingdom;

## PISCES.

kingdom; and the science treating of the orders, genera, species, &c. of this class, is denominated *Ichthyology*. From this word we referred to the present article, meaning to give a very brief sketch of the science, so much having been already said of the structure, the anatomy, and functions of fishes under the article *FISH*, to which we refer our readers for abundant of interesting information on the subject.

The element in which fishes live prevents us from following their motions with exactness, from coming to any very accurate knowledge of their habits and instincts, and from noting with fidelity their specific differences. Their colours, which sometimes are very brilliant, frequently vary, with the accidental circumstances of age, sex, climate, season, &c., and often vanish by exposure to air, or with the principle of life. Hence the natural history of fishes has ever been involved in greater obscurity than that of land animals, which are more readily subjected to the investigation of the learned and curious. Hence the earlier writers on this subject, as Aristotle, Pliny, and Ælian, have mingled as much fable as truth in their accounts, so that they afford few facts that can be depended upon in a scientific point of view. The classical reader may, however, derive entertainment and some instruction from a perusal of their books, with the comments of the learned upon them. Athenæus also discourses of fishes in the seventh book of his *Deipnosophistæ*, as does Oppian in his *Halicuticon*, a Greek poet, who flourished under the reign of Caracalla. (See *OPPIAN*.) Ausonius, a native of Bourdeaux, in the fourth century, in his poem on the river Moselle, has not passed its inhabitants unnoticed. In the dark and middle ages, no writer of note appeared in this department of natural history. The first person who laid the foundation of ichthyological arrangement was Pierre Belon, a French physician, who flourished in the sixteenth century, and who is known by his travels in Judea, Greece, and Arabia, as well as by his writings in natural history. Some of his divisions are deduced from natural resemblances, but others are more fanciful. Belon was an industrious and acute observer, and will be deservedly held in estimation when it is considered how few the resources were of which he could avail himself. (See *BELON*.) His history of fishes appeared in 1551; that of his countryman Rondelet was published three years afterwards, and exhibited more accurate descriptions, and better executed figures, with many excellent remarks, the result of his own observation. He had the merit of exciting a general taste for the study of ichthyology, and was rapidly followed by Salviani, Boslueti, Conrad Gefner, Pison, &c.

Aldrovandus, in 1605, who published a large compilation of Natural History, distributed the fishes according to the nature of their residence: thus he treats, in his *first* book, of those that frequent rocks; in the *second*, of those that live close to the shores, &c. The labours of this naturalist, and of others in the same department, were eclipsed by those of Willoughby, whose work, entitled "*De Historia Piscium*," was printed at Oxford in 1686, and unfolded many new and accurate notions relative to the anatomy and physiology of fishes. His arrangement may be considered as an improved modification of that of Belon. Ray published, in 1707, his "*Synopsis Methodica Piscium*," which may be regarded as an abridged and corrected view of Willoughby's larger work, and as indicating, rather than fixing, a series of genera. This valuable descriptive catalogue continued to be appealed to as a standard, till Artedi and Linnæus effected important changes in the science of ichthyology. The former of these died before he could mature the plan on which he was engaged, and Linnæus, his friend and coadjutor, put the finish-

ing hand to his papers, and then published them in two vols. 8vo. under the titles of "*Bibliotheca Ichthyologica*," and "*Philosophia Ichthyologica*," which in 1792 were republished in four vols. On this account we may ascribe to Artedi the merit of having first traced the outlines of that classification of fishes which is now generally received among the studious and learned in Europe. He first instituted the orders and genera, and defined the characters on which these divisions are founded. Independently of the cetaceous tribes, which are now classed with the Mammalia, the method of Artedi consisted of four great divisions, *viz.* 1. The *Malacopterygian*, which denoted those fishes which have soft fins, or fins with bony rays, but without spines: this order included 21 genera. 2. The *Acanthopterygian*, or those with spiny fins, containing 16 genera. 3. The *Branchioflegous*, which corresponds to the *amphibia nantes* of Linnæus, which want the operculum, or branchioflegous membrane; and 4. The *Chondropterygian*, which answers to that part of the *amphibia nantes*, which have not true bones, but only cartilages, and the rays of whose fins scarcely differ from a membrane. In the first edition of the System of Nature, Linnæus wholly adopted the method of Artedi, but more reflection led him to those changes which he afterwards adopted, and which he matured into that luminous and beautiful system, of which we have so greatly availed ourselves in the course of this work.

We may, before we mention the system of Linnæus as it now stands, observe, that other persons of great learning, of deep research, and accurate observation, have proposed different modes of arrangement, but when they have gone contrary to the method of the Swedish naturalist they have usually been deficient in simplicity. Thus Klein, who attempted to rival him, distributed fishes into three sections, according as they had lungs, and visible or invisible gills; but his sub-divisions were so numerous and complex, that his scheme has never been adopted. That of Gronovius, which lasted but a few years, was founded principally on the presence or absence, and the number or the nature of the fins. The first class includes all the cetaceous animals, and the second all the fishes properly so called. The chondropterygian, and the osseous or bony, form two great divisions, and the osseous are sub-divided into branchioflegous and branchial. These last are grouped according to the Linnæan rules, but in the formation of the genera, the number of the dorsal fins is admitted as a character. Brunnich laboured, but unsuccessfully, to combine the original method of Artedi with the improved one of Linnæus. Scopoli struck out a new path, and assumed the position of the *Anus* as the basis of his three primary divisions; and his secondary characters sometimes coincided with those of Gronovius, and sometimes with those of Linnæus; while his third series of distinctions was drawn sometimes from the form of the body, and sometimes from the teeth. Another ichthyologist, Gouan, the professor of botany at Montpellier, preserved the Linnæan genera, but formed his greater divisions from the union of those of Linnæus and Artedi. His chief sections are of fishes with *complete*, and of those with *incomplete* gills. The first of these is divided into two others, *viz.* *Acanthopterygian*, and *Malacopterygian*, in each of which are arranged the apodal, the jugular, and abdominal species; and a similar process is followed in the second section, which includes the *Branchioflegous* and the *Chondropterygian*. All the authors to which we have thus briefly referred, excepting Belon, Rondelet, and Gronovius, published their works without any regular series of plates illustrative of their descriptions; but there are others who have embellished their volumes with very valuable figures, among whom is Seba,

in his collection of subjects belonging to natural history; Catesby, in his Natural History of Carolina; Broullonet, in his Ichthyologia; and Bloch, in his Natural History of Fishes, first published at Berlin in German, and afterwards reprinted in French in 1785, forming a part of the Histoire Naturelle de Buffon. The original work of Bloch included about 600 species of fishes, which are generally described with accuracy, and figured according to the best means which he possessed, of the natural size, and beautifully coloured. In the historical departments he dwells with minuteness on those that afford food for man, or which suggest facts worthy of remark. He followed the Linnæan method, and made considerable additions to the number of genera. La Cépède, the friend and continuator of Buffon, has executed an elaborate and extensive work on the natural history of fishes. This class of animals he divides into two secondary classes, viz. the cartilaginous and the osseous; each of these consists of four divisions, taken from the combinations of the presence or absence of the operculum, and of the branchial membrane; thus, according to this system, the first division of the cartilaginous includes those fishes which have neither operculum nor branchial membrane; the second, which have no operculum, but a membrane; the third, which have an operculum, but no membrane; and the fourth, those that have both. The same characters, stated in an inverse order, determine the divisions of the osseous species. Each of these divisions is again distributed into the Linnæan orders, and these in their turn are divided into the Linnæan genera, though the latter do not always correspond exactly to those of the Swedish naturalist.

According to the Linnæan system of ichthyology, as it is now arranged, and which is generally followed in the New Cyclopædia, the fins of fishes are named from their situation on the animal, viz. the *dorsal* or back-fin; the *pectoral* or breast-fins; the *ventral* or belly-fins; the *anal* or vent-fin; and the *caudal* or tail-fin. The *ventral-fins* are considered by Linnæus as analogous to feet in quadrupeds, and it is from the situation, presence, or absence of these fins, that he instituted the first four orders of fishes; the other two orders were formed from the nature of their *gills*: thus,

#### Orders.

- I. Apodes are fishes entirely destitute of ventral fins.
- II. Jugulares are fishes that have the ventral fins *before* the pectoral.
- III. Thoracici are fishes that have the ventral fins *under* the pectoral.
- IV. Abdominales are fishes that have the ventral *behind* the pectoral.
- V. Branchiostegous are fishes whose *gills* are destitute of bony rays.
- VI. Chondropterygius are fishes whose *gills* are cartilaginous.

The *generic* character is taken from the shape of the body, the covering, structure, figure, and parts of the head, but principally from the branchiostegous membrane (see *FISH*); and the *specific* character is taken from the cirri, jaws, fins, spines, lateral line, digitated appendages, tail, and colour.

In more modern systems of ichthyology, the last two orders in the Linnæan system are included in the order Pisces cartilaginei, or cartilaginous fishes, which differ from others in having a cartilaginous instead of a bony skeleton. (See *CARTILAGINOUS Fishes*.) This method is adopted in Dr. Shaw's very instructive and entertaining work, entitled "General Zoology," to which our readers are referred.

Mr. Pennant, "in his British Zoology," describes the fishes under the three great divisions of *cetaceous*, *cartilaginous*, and

*bony*. The latter, which is by far the most numerous, he sub-divides into four sections, viz. the *apodal*, *thoracic*, *jugal*, and *abdominal*.

PISCH, in *Geography*, a river of Poland, which runs into the Narew, near Pultusk, in the duchy of Warsaw.

PISCHMA, a river of Russia, which runs into the Tura, near Tiumen.

PISCHSTEIN, a town of Prussia, in Ermeland; 11 miles S.E. of Heilsberg.

PISCIDIA, in *Botany*, from *piscis*, a fish, and *cedo*, to fly or destroy, because it is used for the purpose of intoxicating fish, so that they are easily caught.—Linn. Gen. 367. Schreb. 486. Willd. Sp. Pl. v. 3. 909. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 4. 253. Juss. 358. Lamarck Illustr. t. 605.—Class and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminosæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior; of one leaf, bell-shaped, with five teeth; the two uppermost nearest each other. *Cor.* papilionaceous. Standard ascending, emarginate. Wings equal to it in length. Keel crescent-shaped, ascending. *Stam.* Filaments ten, united into a sheath split along its upper side; anthers oblong, incumbent. *Pist.* Germen superior, stalked, compressed, linear; style thread-shaped, ascending; stigma acute. *Peric.* Legume stalked, linear, with four longitudinal membranous angles, of one cell, separated into several divisions by a kind of plaits. *Seeds* few, nearly cylindrical.

Eff. Ch. Stamens all connected. Stigma acute. Legume with four wings.

1. *P. Erythrina*. Jamaica Dog-wood, or Fish-bean. Linn. Sp. Pl. 993. Willd. n. 1. Ait. n. 1. Jacq. Amer. 209. Swartz Obs. 276. (Piscipula Erythrina; Leoffl. It. 275. Ichthyomethia n. 1; Browne Jam. 296. Pseudocacia, siliquis alatis; Plum. Ic. 229. t. 233. f. 2. Coral arbor, &c.; Sloane Jam. v. 2. t. 176.)—Leaves pinnate; leaflets ovate.—Native of the West Indies. By road sides in Jamaica, on dry chalky hills. The bruised leaves and branches being thrown into water where there are fish, the latter become so intoxicated as to be easily taken by the hand, as they float on the surface. Many other West Indian plants possess the same property. *Jacquin*. (See *PILONIS*.) A large ungraceful tree, twenty-five feet high, easily recognised at a distance by its irregular and singular form of growth. *Leaves* alternate, deciduous, pinnate with an odd leaflet; large, downy, the leaflets ovate, or rather obovate, entire. *Clusters* numerous, erect, many-flowered, lateral or terminal. *Flowers* white, the size of a common pease-blossom. They come out in March and April, before the leaves. *Legume* four or five inches long, with very broad wings.—*P. carthagenensis*, Jacq. Amer. 210. Linn. Sp. Pl. 993. Willd. n. 2, for which Pluk. Phyt. t. 214. f. 4. is quoted, appears evidently to be merely a variety, with more obovate leaves. *Jacquin* cites for this the above figure of Plumier, which other authors make *P. Erythrina*.

2. *P. punicea*. Scarlet Fish-bean. Cavan. Ic. v. 4. 8. t. 316. Willd. n. 3.—Leaves abruptly pinnate; leaflets obtuse.—Native of South America. It has borne flowers and seed in the garden of Madrid. The stem is shrubby, four or five feet high. *Leaves* alternate, of numerous, uniform, smooth, elliptical leaflets, each about an inch long, glaucous beneath. *Clusters* axillary, drooping, simple, solitary. *Flowers* crimson, the size of the foregoing. *Legume* pointed, with narrow wings. *Cavanilles* describes the *stamens* as perfectly diadelphous, an exception to the generic character; and this circumstance, added to the abruptly pinnate leaves, and whole habit, make it probable that the plant is a *Robinia*. The same may be presumed of *P. longifolia*,

*folia*, Willd. n. 4. (*Æschynomene longifolia*; Cavan. Ic. v. 4. 8. t. 315.) This is a native of New Spain, and has also flowered at Madrid. The habit is very like the *punica*, but the *leaflets* are acute, and *flowers* yellow. *Legume* not observed by Cavanilles.

PISCIDIA, in *Gardening*, furnishes plants of the exotic tree kind, of which the species cultivated are the Jamaica dogwood tree (*P. erythrina*); and the Carthaginian piscidia (*P. carthaginiensis*).

*Method of Culture*.—These plants are capable of being increased by seeds, when they can be obtained fresh from the countries where they grow naturally. They should be sown upon a good hot-bed in the spring, and when the plants come up and are fit to transplant, be each planted in a small pot filled with light earth, and plunged into a hot-bed of tanners' bark, and afterwards treated in the same way as the other tender exotics of the same kind.

They afford variety in the stove.

PISCINA, in *Antiquity*, a large basin in an open public place or square, where the Roman youth learnt to swim; and which was surrounded with a high wall, to prevent the casting of filth into it.

The word is formed from the Latin *piscis*, *fish*; because men here imitated fishes in swimming, and because fishes were actually kept in some of these places.

PISCINA was also used for the square basin in the middle of a bath.

PISCINA *probatica* was a pool or reservoir of water, near the court of Solomon's temple; so called from the Greek *προβατον*, *sheep*; because here they washed the cattle, which were destined for sacrifice.

By this piscina it was, that our Saviour wrought the miraculous cure of the paralytic. Davilier observes, there are still remaining five arches of the portico, and part of the basin of this piscina.

PISCINA, or *lavatory*, among the Turks is a large basin placed in the middle of the court of a mosque, or under the porticos that encompass it.

Its form is usually a long square. It is built of stone or marble, furnished with a great number of cocks, wherein the Mussulmans wash themselves before they offer their prayers; as being persuaded, that ablution effaces sin.

PISCINA, the perforated stone usually found in a niche on the right hand side of the altar in our ancient churches and chapels, into which the water used in washing the hands of the officiating priests and other sacred ablutions was cast.

PISCINA, in *Geography*, a town of Naples, in Abruzzo Ultra, the see of a bishop; 18 miles S. of Aquila.

PISCIOOTA, a town of Naples, in Principato Citra; 16 miles W. of Policastro.

PISCIPULA, in *Botany*. See PISCIDIA.

PISCIS, in *Ichthyology*. See FISH.

PISCIS *Australis*, in *Astronomy*. See AUSTRALIS.

PISCIS *Fossilis*, in *Ichthyology*, a name given by Johnston to a kind of the cobitis, found buried in the sand, and dug out by the people in many parts of Germany for food. It is called by many authors the *mustela fossilis*, and by some the *pæcilia*. It is properly a species of cobitis, and is called by Artedi the *bluefish cobitis*, with five longitudinal black lines on each side of the body. See COBITIS.

PISCIS *Sancti Petri*, a name given by Jovius and some other authors to the *faber* or *John Doree*. It is properly a species of *zeus*.

PISCIS *Volans*, the *Flying Fish*, in *Astronomy*, is a small constellation of the southern hemisphere, unknown to the ancients, and invisible to us in these northern regions. See CONSTELLATION.

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PISCIVOROUS ANIMALS are such as feed on fish. See BIRD.

PISCO, in *Geography*, a town of Peru, in the archbishopric of Lima and jurisdiction of Ica, Pisco, and Nasca, formerly situated on the coast of the South sea, but now a quarter of a league from it. An inundation of water, occasioned by an earthquake, in October 1682, destroyed the old town, the ruins of which are still visible. The whole town contains about 300 families, most of whom are Mestizoes, Mulattoes, and Blacks; the whites being the smallest number. The road of Pisco is sufficiently spacious to accommodate a royal navy, and sheltered from the usual winds, which are those between the S.W. and S.E.; 110 miles S.S.E. of Lima. S. lat. 13° 55'. W. long. 76°.

PISCO, a town of European Turkey, in Moldavia, on a lake; 85 miles S. of Jassi. N. lat. 45° 45'. E. long. 27° 38'.

PISCO *Pagani*, a town of Naples, in the province of Basilicata; seven miles N.W. of Muro.

PISCOBAMBA, a town of South America, in the jurisdiction of Guamalies.

PISCOPIA, or TILO, a small island in the Mediterranean; 16 miles N.W. of Rhodes. This island lies nearly in the middle of the interval which separates the isle of Rhodes from that of Stancho; and is somewhat larger than Limonia and Narki. It has a tolerably good harbour, and several anchorages, which are useful accommodations for ships that frequent these seas. The ancients called it Telos, and they highly esteemed the perfumes which were there prepared. This branch of trade is lost; but it proves the goodness of the soil of Piscopia, and the mildness of its climate; circumstances the most favourable to the expansion of the sweet odour of plants and flowers. N. lat. 36° 34'. E. long. 27° 9'.

PISCOPIA, or *Episcopi*, a town of the island of Cyprus, near a river anciently called "Lycus." In its vicinity are some magnificent ruins, supposed to be those of the ancient city of Curias. The environs furnish cotton and fruit trees in abundance.

PISDRI, a town of the duchy of Warfaw; 22 miles S. of Gnesna.

PISE', a term applied to a peculiar mode of forming buildings of different kinds, but more especially those designed for farm purposes, with some sort of stiff earthy materials of a loamy quality. It is an easy, economical, and convenient method, which had its rise on the continent, and which has been had recourse to, for some time, in some parts of this kingdom, as in Bedfordshire, Lancashire, &c. See below.

PISÉ, *Building in*, in *Rural Economy*, the name of a method of building with loamy or other earthy matters, which has long been practised with great success, and in a very cheap manner, in some departments of France, and which is now had recourse to with similar advantage in some parts of this country. It has been described, delineated, and recommended by Mr. H. Holland in the first volume of Communications to the Board of Agriculture, and is to be managed somewhat in the manner directed below.

*Sorts of Implements necessary for*.—In this sort of work, in addition to the common tools, such as spades, trowels, baskets, watering pots, a plumb rule, hatchet, hammer, and nails, a mould and rammer are likewise required. The following are the different constituent parts. In the plate on pisé buildings and implements, *fig. 1.* is an outside view of the mould; *fig. 2.* inside ditto; *fig. 3.* the head of the mould, seen without; *fig. 4.* the other face, seen within; *fig. 5.* wedges; *fig. 6.* a round stick

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termed the wall-gage; *fig. 7*, post to be set upright, but seen flatwise, with its tenon; *fig. 8*, the same on its back, also with its tenon; *fig. 9*, joists in which the mortises are cut, seen flat; *fig. 10*, the same, with the side and bottom cut; *fig. 11*, a mould put together, all the parts seen, as well as a small rope; *fig. 12*, the rammer, or pifoir, for ramming the earth in mould; *fig. 13*, the side view of the same on a large scale; *fig. 14*, the plan of the instrument, seen on the top.

And in constructing the mould, it is advised to take several planks of light wood, each ten feet long, in order that the mould may be easy to handle; deal is the best, as being less liable to warp, to prevent which the boards should be straight, sound, well seasoned, and with as few knots as possible. They should be ploughed and tongued, and planed on both sides. Of these planks, fastened together with four strong ledges on each side, the mould must be made two feet nine inches in height; and two handles should be fixed to each side, as at *figs. 1* and *2*. The head of the mould, which serves to form the angles of the building, must be made of two narrow pieces of wood, ploughed, and tongued, and ledged; in breadth eighteen inches, and in height three feet; and it should be planed on both sides, as at *figs. 3* and *4*, where it will be remarked, that this part of the mould diminishes gradually to the top, in order that the wall may be made to diminish in the same degree. It is added, that all the boards and ledges must be, after they are planed, something more than one inch thick. And that the wedges, *fig. 5*, must be an inch thick, and from eight to twelve inches high; and the gage, *fig. 6*, be cut in length equal to the thickness of the wall that is to be erected.

It is still further stated, that the eight ledges which are necessary to secure the two large sides of the mould, serve also to receive eight upright posts, standing on four joists. The posts, *figs. 7* and *8* in the plate, may be made either of wood sawed square, or of round wood of any kind; so that one may use indifferently the ends of rafters, joists, small trees, or their branches. These posts are to exceed the height of the mould by eighteen inches; they must, therefore, be about five feet high, including their tenons (which should be six inches long), and three by four inches wide. That part which is to bear against the ledges of the mould must be made flat and straight, the other sides need not be worked with so much truth. And the joists may be of the same sort of stuff, three feet six inches long, three inches and a half broad, and three inches thick. On the broad part must be made the two mortises, as at *fig. 9* in the plate, ten inches and a half long, and rather more than an inch wide, and at each end three inches and a half must be left beyond the mortises, so that the interval between them will be fourteen inches. These dimensions must be observed, in order that the two sides of the mould may incline towards each other, and the thickness of the wall be gradually diminished, till it is reduced to fourteen inches at the roof. Of course the dimensions for the joists are these:

The two ends, remaining beyond the mortises, } ft. in.	0 7
three inches and a half each - }	
The two mortises, ten inches and a half each -	1 9
The interval between the mortises -	1 2
Total length of the joist	3 6

It may be noticed, that the elevation of the whole machine is seen at *fig. 11* in the plate; and the following is a list of its several parts, enumerated in the same order that

the workmen must follow, when they erect the mould on a wall. A, stone foundation, eighteen inches thick, on which the wall of earth is to be raised; B, the joists placed across the foundation wall; C, C, the two sides of the mould, including between them three inches of the foundation wall; D, D, the two upright posts, the tenons of which fit into the mortises of the joist; E, the wall-gage, which fixes the width of the mould at the top, and which is shorter than the width of the wall at the bottom, to regulate the diminution of the wall to be erected; F, a small cord, something less than half an inch diameter, making several turns round the posts; G, a stick, which, by being wound round, fastens the cord, and holds the posts tight together; H, H, wedges, which enter into the mortises in the joists, and keep the posts and the mould firmly fixed against the wall. But though such is the process of erecting the mould, a contrary order must be observed in taking it to pieces. The rope must be loosened, the wedges taken out, and the posts, the mould, and the joists removed, in order to refix the whole again. And the rammer with which the earth is rammed into the mould, is a tool of the greatest consequence, and on which the firmness and durability, in short, the perfection of the work depends, and in making which more difficulty will be found than is at first apprehended. It should be made of hard wood, either ash, oak, beech, walnut, &c. or, what is preferable, the roots of either of these sorts of wood.

And in regard to the nature of this sort of work, it differs very essentially from that miserable way of building with clay or mud mixed with hay or straw, which is often seen in country villages; it contains all the best principles of masonry, together with some rules peculiar to itself. At *fig. 15*, in the plate, is represented the plan of a house, the building of which is regularly described according to this method. The foundation may be made of any kind of masonry that is durable, and must be raised to the height of two feet above the ground; which is necessary to secure the walls from the moisture of the earth, and the splashing of the rain, which will drop from the eaves of the roof. When these foundation walls are made level, and eighteen inches thick, mark upon them the distances at which the joists are to be set for receiving the moulds; those distances should be three feet each from centre to centre. Each side of the mould being ten feet long will divide into three lengths of three feet each, and leave six inches at each end, which serve to lengthen the mould at the angles of the house, and are useful for many other purposes. After having set the joists in their places, the masonry must be raised between them six inches higher, that is, to a level with the joists; here will, therefore, upon the whole, be a base of two feet and a half, which in most cases will be found more than sufficient to hinder the rain, frost, snow, or damp, from injuring the walls. Raise the mould in the manner mentioned above, immediately on this new masonry, placing it over one of the angles of the wall. The head of it, which is to be placed against the angle, should have eighteen inches in breadth at the bottom, and only seventeen inches and a half at the top; thus the sides of the mould will incline towards each other, and produce that diminution in the thickness of the wall, which is usual in buildings of this nature. The wedges must then be driven in, and the posts well fixed by cords, and the head of the mould secured by iron pins, when the whole is ready for the workmen to begin their work.

In addition it is stated, that a workman should be placed in each of the three divisions of the mould, the best being placed at the angle. He is to direct the work of the other two,

two, and by occasionally applying a plumb-rule, to take care that the mould does not swerve from its upright position. The labourers who dig and prepare the earth must give it in small quantities to the workmen in the mould, who, after having spread it with their feet, begin to press it with the rammer. They must only receive at a time so much as will cover the bottom of the mould to the thickness of three or four inches. The first strokes of the rammer should be given close to the sides of the mould, but they must be afterwards applied to every other part of the surface; the men should then cross their strokes, so that the earth may be pressed in every direction. Those who stand next to one another in the mould should regulate their strokes so as to beat at the same time under the cord, because that part cannot be got at without difficulty, and must be struck obliquely; with this precaution the whole will be equally compressed. The man at the angle of the wall should beat carefully against the head of the mould, and for the sake of the appearance, or perhaps to increase the strength of the building, it is usual to spread every six inches high a layer of mortar near the head, in imitation of the joints of stone-work. Care must be taken, that no fresh earth is received into the mould till the first layer is well beaten, which may be ascertained by striking it with the rammer; the stroke should leave hardly any print on the place. They must proceed in this manner to ram in layer after layer till the whole mould is full. When this is done, the machine may be taken to pieces, and the earth which it contained will remain firm and upright, about nine feet in length, and two feet and a half in height. The mould may then be replaced for another length, including one inch of that which has first been completed: the regular manner of joining the different lengths may be seen in the geometrical elevations in the plate at *fig. 16*, and more particularly at *fig. 17*, where it will be observed, by the letters A and B, that no joints are left in this work, as the different lengths are united, and made to press one on the other. In the second length, and most of the following, the head of the mould is useless; it is only made use of at the angles. As soon as the workmen have gone round the whole building, taking the mould to pieces and putting it together again successively, they should begin upon the partition marked C in the same plate *fig. 15*, where the head of the mould must be used, as the door jambs are squared like the angles of the wall. The jamb next to the exterior wall, which is too narrow to be made of pisé, can easily be made of wood, brick, or stone. And the first course being thus completed proceed to the second, and here it must be observed, that if in laying the first course the work begin with one angle, as the angle A, *fig. 15*, and proceed towards E, it must, for the second course, begin with A, and proceed towards B, and so in each successive course it must proceed in a direction contrary to that of the preceding. It may easily be conceived, that with this precaution the joints of the several lengths will be inclined in opposite directions, which will contribute very much to the firmness of the work. There is no reason to fear overcharging the first course with the second, though but just laid; for three courses may be laid without danger in one day; mark the grooves for receiving the joints in the first course, at the distance of three feet from one another, but not immediately over the former grooves, but over the middle points between them, as seen at *fig. 17*, in the plate. These grooves must be cut with a pick-axe, and the second course completed in the same manner as the former, except that it must proceed in a contrary direction, as was before observed, and that the head of the mould and wall-gage must be diminished, in

order that the same inclination of the sides to one another that was given to the first course, may be preserved in this second. It must, however, be remarked, that this second course is not to be continued without interruption like the first, as it is necessary that the partition-wall should join or bond into the exterior wall; or rather, that all the walls in the building, whether outside or partition-walls, which meet at an angle, should cross each other at every course. In pursuance, therefore, of this rule, when the work has been advanced from A to C, or perhaps not quite so far as C, leave the exterior wall, and turn the mould to the partition, applying the face of it to C. This will appear more clearly by the letter G, in the same plate *fig. 17*. When the work has been carried on along the partition-wall as far as the door, bring back the mould to the part which remained unfinished in the exterior wall, marked C, at *fig. 15*, in the plate; and after having filled up that space, carry the mould on beyond the partition-wall, and complete the course. The reason of the partition-wall on the side opposite to C, not being connected in the same manner with the interior wall, is that it ought to be made of wood or brick-work, and not of this material, but the third course must be carried over the door, and join into the wall, as above. It has been observed, that this description of the two first courses is equally applicable to all the others, and will enable any person to build a house, with no other materials than earth, of whatever height and extent he pleases to have it.

Besides this, it may be remarked that the gables cannot be crossed, as these are detached from one another; but as their height is so inconsiderable, and they are besides connected together by the roof, this is not of any consequence. They may be made without any difficulty, by merely making their inclination in the mould, and working the earth accordingly. It has been observed, that each course will be two feet and a half high, if the mould is two feet nine inches; for the mould must include three inches of the course beneath. For this reason the grooves are made six inches deep, though the joists are only three inches in thickness. If the directions which have been given for diminishing the thickness of the walls are observed, that thickness will be reduced to fifteen inches at the roof, in a house (like that of which a design is annexed) consisting of six courses; for in each course there will be an inclination of half an inch. The gables might have been reduced to fourteen inches only in thickness, as an interval of fourteen inches only was left between the mortises of the joists: and by increasing or diminishing that interval the thickness of the walls may be regulated at pleasure.

It is noticed that in this mode of building, according to the account of the Rev. Mr. Jancour, as practised at Montbrison, the capital of the Forêts in France, as transmitted to the Board of Agriculture, the earth is pounded as much as possible, in order to crumble any stones therein; clay is added thereto in a small quantity, about one-eighth part. It is all beaten and mixed up together by repeated blows with a mallet about ten inches broad, ten or fifteen long, and two inches thick. The earth being thus prepared and slightly wetted, the foundation of the house is dug for; this is laid with stone, and when it is about one foot high above the surface of the ground, planks are arranged on each side, which are filled with the earth intended for the wall. It is strongly beaten; and this method is continued successively all round the building. The walls have more or less thickness, according to the fancy of the owner; he has seen them of six and of eighteen inches thick. Some builders intersperse from space to space a thin layer of lime. If several stories are intended in such erections, they do not fail

to place beams to support the floors before they build higher; the windows and doors are attended to in the same manner. Of such buildings he never saw any consisting of more than two stories at most; generally they have but one besides the ground-floor. When the building is thus finished, it is left for some months to dry: then such as wish to make the building more solid and durable, give it a rough-cast coating on the outside with lime and sand.

And in regard to the manner of forming the openings for the doors and windows, they should be left at the time of building the walls. This may be done by placing within the mould either two or one of the heads, (as represented *figs. 3 and 4* in the plate,) as may be necessary, wherever the wall is to terminate and the opening commence. They should be made sloping a little, in order to leave room for the frames and sashes. And the exterior decorations of the windows and doors are usually made, by the rich, of stone or brick, and by the poor of wood, which latter have a bad effect on the appearance of the house, as wood will never unite well with pisé-work; and notwithstanding the greatest precautions, the exterior covering will break and fall off the wood; whereas stone or brick-work unite perfectly with the pisé, and retain their plaster, and of course the paint, of which it forms the ground. The chimney-pieces of brick or stone are laid and united with the walls in the same manner as in common buildings; and the flues are also very firmly connected with them, being made of brick-work. But a very particular advantage is, that the apartments may be very handsomely finished, without making any jambs to the inside doors, either of stone, brick, or wood. The finishing of the earthen walls will make jambs unnecessary, and it is not requisite to be at the expence of any other finishing, as the doors may be hung on the grounds or wainscot of the apartment, as may be found necessary.

*The particular Nature of, and Manner of preparing the Earth.*

—It is further observed that beating, or compression, is used in many different sorts of work; the ancients employed it in making their rough walls; the Italians employ it for the terraces which cover their houses; the Moors for all their walls; the Spaniards, the French, and others, for some of the floors of their apartments. The intent of the ancient architects, when they recommended the beating of cement, and other compositions used in building, was to prevent them from shrinking and cracking; and it is employed for the same purpose in the walls which are made of earth. The beater, by repeated strokes, forces out from the earth the superfluous water which is contained, and closely unites all the particles together, by which means the natural attraction of those particles is made powerfully to operate, as it is by other natural causes, in the formation of stones. Hence arises the increasing strength and astonishing durability which houses of this kind are found to possess. It is added that upon beating a small portion of earth, and weighing it immediately afterwards, it was found to contain thirty-nine pounds and a half; fifteen days after it had lost four pounds and a quarter; in the space of another fifteen days it lost but one pound; and in fifteen days after that its weight diminished only half a pound. In the space of about forty-five days the moisture was completely evaporated, and its weight was diminished about one-eighth; consequently only one-eighth of the whole mass was occupied by moisture, and this small proportion cannot at all affect the solidity and consistency of the earth so treated. This experiment is also sufficient to shew the difference between this kind of building, and that vulgar kind called in England “mud-walling;” the latter cannot be executed without adding a great deal of water, to soften the materials employed, which

entirely destroys their consistency; the water, which occupies a considerable space in the mud, leaves, in evaporating, an infinite number of pores or little cavities, and thus the walls become weak and brittle, and incapable of supporting several stories, or such ponderous weights as the beaten earth or pisé can sustain.

And with regard to the quantity or height of walling of this sort that may be done in one day, it is stated, that three courses, of about three feet each, may be laid one over the other in the course of a day; so that a wall of earth, of about eight or nine feet, or one story high, may be raised in the same time. Experience has proved, that as soon as the builders have raised their walls to a proper height for flooring, the heaviest beams and rafters may, without danger, be placed on the walls thus newly made; and that the thickest timber of a roof may be laid on the gables of this sort the very instant they are completed.

Further, on the proper sorts of earth for this use, it is stated, that, 1st. All earths in general are fit for such use, when they have not the lightness of poor lands, nor the stiffness of clay. 2dly. All earths fit for vegetation. 3dly. Brick-earths; but these, if they are used alone, are apt to crack, owing to the quantity of moisture which they contain. This, however, does not hinder persons who understand the business from using them to a good purpose. 4thly. Strong earths, with a mixture of small gravel, which for that reason cannot serve for making either bricks, tiles, or pottery. These gravelly earths are very useful; the best work of this sort is made of them. And it is said, that from the following marks may be known what earths are fittest to be employed by themselves. When these have been described, it will remain to point out such as must be mixed with others, in order that they may acquire the necessary quality. And the following appearances indicate that the earth in which they are found is fit for building: when a pick-axe, spade, or plough, brings up large lumps of earth at a time; when arable lands lie in clods or lumps; when field-mice have made themselves subterraneous passages in the earth; all these are favourable signs. When the roads of a village, having been worn away by the water continually running through them, are lower than the other lands, and the sides of those roads support themselves upright, it is a sure mark that the work may be executed in that village. One may also discover the fitness of the soil, by trying to break with one's fingers the little clods of earth in the roads, finding a difficulty in doing it, or by observing the ruts of the road in which the cart-wheels make a sort of pisé by their pressure: whenever there are deep ruts on the road, one may be sure of finding abundance of proper earth. And proper earth is found at the bottom of the slopes, on low lands that are cultivated, because every year the rain brings down the fat or good earth. It is frequently found on the banks of the rivers; but above all, it is found at the foot of hills where vines are planted, and of all cultivated lands which have much slope. In digging trenches and cellars for building, it generally happens that what comes out of them is fit for the purpose of this sort of building. But as it may sometimes happen that earth of a proper quality is not to be found on the spot where it is intended to build, it becomes of importance to attend to the method of mixing earths; for though the earth which is near at hand may not of itself be proper, it is very probable that it may be rendered so by the mixture of a small quantity of another earth fetched from a distance. The principle on which a mixture must be made is very simple; strong earths must be tempered with light; those in which clay predominates, with others that are composed more of chalk and sand; and those of a rich, glutinous substance,

## PISE.

with others of a poor and barren nature. The degrees in which these qualities of the earth prevail, must determine the proportions of the mixture; which it is impossible here to point out for every particular case, but which may be learnt by a little practice. And it will not be amiss to mix with the earth some small pebbles, gravel, rubbish of mortar, or in short any small mineral substances; but none of the animal or vegetable kind must be admitted. Such hard substances bind the earth firmly between them, and being pressed and pressing in all directions, contribute very much to the solidity of the whole; so that well-worked earth, in which there is a mixture of gravel, becomes so hard at the end of two years, that a chissel must be used to break it, as if it was freestone, or other solid stone.

The following experiments are detailed in order to ascertain the qualities of any earth.

*Experiment 1.*—Take a small wooden tub or pail, without a bottom, dig a hole in the ground of a court or garden, and at the bottom of that hole fix a piece of stone, flat and level; place your tub upon the stone, fill around it the earth that has been dug out to make the hole, and ram it well, that the tub may be enclosed, to prevent its burbling. Then ram into the tub the earth you mean to try; putting in, at each time, about the thickness of three or four fingers' breadths; when this is well rammed, add as much more, and ram it in the same manner, and so the third and fourth, &c. till the earth is raised above the brim. This superfluous earth must be scraped off extremely smooth, and rendered as even as the under part will be, which lies on the stone. Loosen with a spade the earth round the tub, and you will then be able to take it out, and with it the compressed earth that it contains; then turn the tub upside down, and if it is wider at the top than at the bottom, as such vessels usually are, the pise will easily come out; but if it should happen to stick, let it dry in the air about twenty-four hours, and you will then find that the earth is loose enough to fall out of itself. You must be careful to cover over this lump of pise with a little board; for though a shower of rain, falling in an oblique direction, will not injure it, yet it may be a little damaged, if the rain falls perpendicular, and especially if it remains upon it. Leave the lump exposed to the air, only covered with a board or flat stone, and if it continues without cracking or crumbling, and increases daily in density and compactness, as its natural moisture decreases, you may be sure that the earth is fit for building. But you must remember that it is necessary that the earth employed should be taken from a little below the surface of the ground, in order that it may be neither too dry nor too wet: it must be observed also, that if the earth is not well pressed around the outside of the tube before it is filled, though the hoops were of iron, they would burst, so great is the pressure of the beaten earth against the mould, of whatever size it may be.

*Experiment 2.*—This trial may be made in the house. Having brought from a field the earth you want to try, press it in a stone mortar, with a pebble of wood, brass, or iron (the latter is best); or with a hammer; fill the mortar above the edge, and then with a large knife, or some other instrument, take away the superabundance of the earth even with the brim. If you find then that the earth will not quit the mortar, you must expose it to the sun, or near a fire; and when it is sufficiently dry, it may be taken out without difficulty by turning the mortar upside down on a flat stone, or the floor. It will have the shape of the mortar, and if exposed as above directed, will shew the quality of the earth.

*Experiment 3.*—Press with the end of a stick, or cane, your

earth in a little box, round which you had better first tie a piece of packthread, lest it should burst in the operation; when you have filled it above its brim, cut off the overplus with a knife; you will undoubtedly be obliged to break the box to get it out, unless you had rather wait, and let it dry in the air, in the sun, or before a fire. It will take the exact form of the box, be it round, square, or oval; if your earth be red, or any other colour, that which is enclosed in the box will still remain the same. It is not improper to remark, that the colour of the earth neither adds to nor diminishes the goodness of the pise, therefore every proprietor may be at ease on that head. Besides, every person in walking on his ground, may make little balls of earth, and press them as tight as he can between his hands. If he brings them home and puts marks on them, he will by that means know the quality of every piece of land, and also be a judge of the mixture it will be necessary to make.

Further, in preparing the earth, all the operations are very simple and easy: there is nothing to be done but to dig up the earth with a pick-axe, break the clods with a shovel, so as to divide it well, and then lay it in a heap; which is very necessary, because as the labourers throw it on that heap, the lumps of earth and large stones roll to the bottom, where another man may break them, or draw them away with a rake. He must observe, that there should be an interval of about an inch and a quarter between the teeth of the rake, that the stones and pebbles of the size of a walnut, or something more, may escape, and that it may draw off only the largest. If the earth that has been dug has not the proper quality, which is seldom the case, and that it is necessary to fetch some better from a distance, then the mixture must be made in this manner: one man must throw one shovel full of the best sort, while the others throw five or six of the inferior sort on the heap, and so more or less, according to the proportion which has been previously ascertained. No more earth should be prepared than the men can work in one day, or a little more, that they may not be in want; but if rain is expected, you must have at hand either planks, mats, or old cloths to lay over the heap of earth, so that the rain may not wet it; and then as soon as the rain is over, the men may resume their work, which, without this precaution, must be delayed: for it must be remembered, that the earth cannot be used when it is either too dry or too wet, and therefore if the rain should wet it after it has been prepared, the men will be obliged to wait till it has recovered its proper consistency; a delay which would be equally disadvantageous to them and their employer. When the earth has been soaked by rain, instead of suffering compression, it becomes mud in the mould; even though it be a little too moist, it cannot be worked: it swells under the blows of the rammer, and a stroke in one place makes it rise in another. When this is the case, it is better to stop the work, for the men find so much difficulty, that it is not worth while to proceed. But there is not the same necessity of discontinuing the work when the earth is too dry, for it is easy to give it the necessary degree of moisture; in such a case it should be sprinkled with a watering-pot, and afterwards well mixed together; it will then be fit for use. It has already been observed, that no vegetable substances should be left in the earth; therefore in digging, as well as in laying the earth in a heap, great care must be taken to pick out every bit of root, great and small, all sprigs and herbs, all bits of hay and straw, chips or shavings of wood, and in general every thing that can rot, or suffer a change in the earth after it has been prepared in this manner for use in building.

*The Kind of Timber necessary.*—It is stated that, in order

to make good walls, it is not sufficient that the earths be well beaten, but they must be well united together. In houses of brick or stone, to consolidate their parts, they make use of angles and binders of free-stone, and of iron braces, and cramp irons, which are very expensive; but here the binders cost very little; they consist only of thin pieces of wood, a few cramps and nails, and these are sufficient to give the greatest stability to buildings of pise. It is added, that the first course A, *figs. 15 and 16* in the plate, being laid on the front and inner walls of a house, then begin the second; and if, for the inferior course, the mould has been directed from A to E, it must, for this second, be directed from A to F, as has been explained above. But before this second course is begun, lay at the bottom of the mould a board about five or six feet long, resting on the angle A, and extending lengthwise towards B. This board must be rough as the sawyers have left it, something less than an inch thick, and in breadth about eight, nine, or ten inches, so that there may remain on each side four or five inches of earth, if the wall is eighteen thick; by this means the board will be entirely concealed in the body of the wall. When thus placed, neither the air nor damp can reach it, and of course there is no danger of its rotting. This has often been proved by experience, as in taking down old houses of pise such boards have always been found perfectly sound, and many that had not even lost the colour of new wood. It is easy to conceive how much this board, from the pressure of the work raised above it, will contribute to bind together the two lengths A and B, and to strengthen the angle A; but this is not all, it is useful (particularly when the earth is not of a very good quality) to put ends of planks into the pise after it has been rammed about half the height of the mould. These ends of planks should be only ten or eleven inches long, to leave as before a few inches of earth on each side of the wall, if it is eighteen inches thick; they should be laid crosswise (as the plank before-mentioned is laid lengthwise) over the whole course, at the distance of about two feet from one another, and will serve to equalize the pressure of the upper parts of the works on the lower course of the pise, or rammed earth. But these boards need only be placed at the angles of the exterior wall, and in those parts where the courses of the partition-walls join to those of the exterior wall; the same directions that have here been given for the second course, must be observed at each succeeding course, up to the roof. By these means, it is seen, an innumerable quantity of holders or bindings will be formed, which sometimes draw to the right, sometimes to the left of the angles, and which powerfully unite the front walls with those of the partitions; the several parts deriving mutual support from one another, and the whole being rendered compact and solid. Hence these houses, made of earth alone, are able to resist the violence of the highest winds, storms, and tempests. The height that is intended to be given to each story being known, boards of three or four feet in length should be placed before-hand in the pise, in those places where the beams are to be fixed, and as soon as the mould no longer occupies that place, the beams may be laid on, though the pise be fresh made; little slips of wood, or boards, may be introduced under them, in order to fix them level. The beams thus fixed for each story, the pise may be continued as high as the place on which you intend to erect the roof of the building.

And beside the use of this sort of material in the building of houses, it may be applied to the raising of walls for different sorts of inclosures, as parks, gardens, yards, &c. in which the mould must be fixed in an angle, or against a

building, if the wall is to reach so far, and the workmen must proceed from thence to the other extremity of the wall; and when they have finished the first course, they must raise the mould to make the second, returning to the place where they began the first. But when a very great inclosure is to be made, as for instance a park wall, then, for the sake of speed, it is necessary to set several moulds and men at work. In such a case, a mould should be placed at each end, and the number of men be doubled; they will work at the same time, and meet in the middle of the wall, where they will close the first course; after which each set of men raise their mould to make the second; and both setting out from the middle continue working, in opposite directions, towards the ends where they first began.

In this way houses may be built, which are strong, healthy, and very cheap; and which will last a great length of time, as the author says, he had pulled down some of them, which, from the title deeds in the possession of the proprietors, appeared to be 165 years old, though they had been ill kept in repair. The rich traders of Lyons have, he observes, no other way of building their country-houses. An outside covering of painting in fresco, which is attended with very little expence, conceals from the eye of the spectator the nature of the building, and is a handsome ornament to the house. That method of painting has more freshness and brilliancy than any other, because water does not impair the colours. No size, oil, or expence is required, manual labour is almost all it costs, either to the rich or poor. Any person may make his house look as splendid as he pleases for a few pence laid out in red or yellow ochre, or in other mineral colours. And he adds that strangers, who have failed upon the Rhone, probably never suspected that those beautiful houses which they saw rising on the hills around them, were built of nothing but earth; nay, many persons have dwelt for a considerable time in such houses, without ever being aware of their singular construction. Farmers in that country generally have them simply white-washed, but others, who have a greater taste for ornament, add pilasters, window-cases, pannels, and decorations of various kinds.

Besides, it is suggested that there is every reason for introducing this method into all parts of the kingdom; whether we consider the honour of the nation as concerned in the neatness of its villages, the great saving of wood which it will occasion, and the consequent security from fire, or the health of the inhabitants, to which it will greatly contribute, as such houses are never liable to the extremes of heat or cold. It is attended with many other circumstances that are advantageous to the state, as well as to individuals. It saves both time and labour in building, and the houses may be inhabited almost immediately after they are finished; for which latter purpose the holes made for the joists should not be closed up directly, for the air, if suffered to circulate through them, will dry the walls more speedily. And the durability of this sort of building is fully shewn by the statement of the Rev. Mr. Jancour, who resided at Montbrison in France, where, he says, the church was the most remarkable in this style of building; it is about eighty feet long, forty feet broad, and fifty feet high; the walls built in pise eighteen inches thick, and *crépé*, or rough-cast on the outside with lime and sand. Soon after his arrival, the church, by some accident, was destroyed by fire, and remained unroofed for about a twelvemonth, exposed to rains and frost. As it was suspected that the walls had sustained much damage, either by fire or the inclemency of the season, and might fall down, it was determined to throw them down partially, and leave only the lower parts standing;

but even this was not done, he adds, without much difficulty, such was the firmness and hardness these walls had acquired, the church having stood above eighty years; and all the repairs required, were only to give it, on the outside, every twelve or fifteen years, a new coating of rough-cast. And it is further remarked, that besides the advantages of strength and cheapness, this method of building possesses that of speed in the execution. It is found that a mason used to work, can, with the help of his labourer, when the earth lies near, build, in one day, six feet square of the pise. If two men can build, in one day, six feet square, it is evident that six men, which is the necessary number to work the mould, (*viz.* three in the mould, and three to dig and prepare the earth,) will build, in the course of sixteen days, or three weeks at most, such a house as is seen in the plate, at *figs.* 15 and 16, containing 228 square feet of wall; a very short time therefore is sufficient for a man to build himself a solid and lasting habitation. These facts, which have been proved by numberless instances, afford a proportion by which every one may determine the time that his house or wall will take in building, having first ascertained the number of feet it will contain. Thus, if he wishes to have a wall 540 feet long, and six feet high, it will be finished in one month, with one single mould, and six men; but if he doubles both mould and men, it will be done in fifteen days. These are simple but necessary instructions, for they will prevent the inconvenience to which many are exposed from having the completion of their building protracted beyond the time that they originally expected. All persons who wish to build, may now contract with the builder that the work shall be finished on such a day; or that he shall indemnify them for all the losses which they may incur from his failure to make good his engagement in that respect.

And in regard to the outside covering of plaster, which is proper for rammed earth or pise walls, it is quite different from that which is made use of on any other walls: it is necessary, too, to take a proper time for laying it on. When a house of this sort has been begun in February, and completed in April, the covering may be laid on in the autumn, that is to say, five or six months after it is finished; or if it is finished in the beginning of November (at which time the masons generally give over working) it may be laid on in the spring. In this interval the walls will be sufficiently dried; but it must not be imagined that it is the drought or cold that extracts the moisture from an earthen wall; it is only the air, which is of itself sufficient either in summer or winter, to dry a pise or rammed-earth wall thoroughly. If the plaster be laid over them before the dampness is entirely gone, it must be expected that the sweat of the walls will cast it off.

But in order to prepare the walls for plastering, they should be indented with the point of a hammer, or hatchet, without being afraid of spoiling the surface left by the mould; all those little dents must be made as close as possible to each other, and cut in, from top to bottom, so that every hole may have a little rest in the inferior part, which will serve to retain and support the plaster. And to do it the masons must make a small scaffold in the holes which the joists of the mould have left at *figs.* 2 and 3 in the plate. This scaffold may be made in a few minutes, and when, with the assistance of it, they have indented the upper parts of the house, they must run a stiff brush over the indented surface, to remove all dust or loose earth. The walls, when thus prepared, may receive the plastering; but it should be observed that there are two kinds of plaster that may be used in the pise; rough-cast, and stuccoing. Rough-cast consists of a small quantity of mortar, diluted with water in a tub, to

which a trowel of pure lime is added, so as to make it about the thickness of cream. Stucco is nothing more than poor mortar, which the labourers make up in a clean place near the lime-pit, and carry it to the masons on the scaffold.

Besides, for the purpose of rough-casting one workman and his labourer are sufficient; the workman only sprinkles with a brush the wall he has indented, swept, and prepared; after that he dips another brush, made of bits of reed, box, &c. into the tub which contains the rough-cast, and throws with this brush the rough-cast against the wall; when he has covered, with as much equality as possible, so much of the wall as is within his reach, he lowers his scaffold, and stops up the holes of the joists with stones, or old plaster, &c. does as before, and continues lowering his scaffold in the same manner till he comes to the bottom of the house. This rough-cast, which is attended with so little trouble and expence, is notwithstanding the best cover that can be made for pise or rammed-earth walls, and for all other constructions; it contributes to preserve the buildings, and though not beautiful, has the recommendation of being attainable by people in moderate circumstances. It is the peculiar advantage of these buildings that all the materials they require are cheap, and all the workmanship simple and easy to be performed.

But in regard to the process of stuccoing it is very different; two workmen and two labourers are requisite, the two workmen being on the scaffold, and one of the labourers making up the mortar, while the other carries it with water, and serves the workmen. One of the workmen holds in his right hand a trowel, and in the other a brush, with which he sprinkles the wall, having beforehand indented and swept it; after that, he lays on a few trowels full of stucco, which he spreads as much as possible with the same trowel, and then he lays on more, and thus continues his work. The second workman has also in his left-hand a brush, and in his right-hand a small wood float; he sprinkles water over the mortar that his partner has spread, and rubs over that part he has wetted with his wood float. Thus the first workman lays on the plaster, and advances gradually, the second follows and polishes; one labourer makes up the stucco, the other carries it, and serves the workmen. By this process the smoothest, finest, and cheapest plastering is made. And at the same time that the plaster is laid on, it may also be whitened by the use of lime alone, which is also an object of economy, since it saves white lead, &c. For this purpose dilute lime in a tub of very clear water, and let a labourer take some of it in a pot, and carry it to the workmen, who must lay it on with a brush; this, as well as all other colours, adheres to the plaster, and never falls, although it is used with water only, without size or oil. This is to be attributed to the precaution of laying on the colour whilst the plaster is still wet; as it grows dry, it incorporates the mineral colours with its own substance, and makes them last as long as itself. This is on the principles of fresco colouring or painting, which is very neat.

And it is added, that the lime is of very general utility; it is used in building, in plastering, and in white-washing; and it will appear that for painting also it may be employed with advantage. Those who intend to build, therefore, ought always to have a store of it by them, and it should be slaked a long time before it is used, to prevent crevices and blisters, which, without this precaution, will arise in the plaster, and give it so disagreeable an appearance, that it will be necessary to do the work over again. The reason of it is this, there will always remain in the lime some particles that have not been slaked in the pit; all the stones are not

entirely reduced to lime in the kiln, and those stones will resist the action of the water for a time, and will burst from the plaster after it has been laid, leaving the crevices above-mentioned. This inconvenience will not happen if the lime, after being slaked, is left to stand some time before it is used. Indeed it will not be amiss to let it lie by a whole year, or longer, when it can be done with convenience. Besides this, it is observed on the painting in fresco of the outside covering, that that kind of painting which is known by this name, is the most beautiful and cheapest of any, and it is that which the author recommends for the decoration of pisé or rammed-earth buildings. The most celebrated painters were very partial to it, and Rome furnishes many excellent models, which should engage us to restore it from that neglect and disuse into which it has, without reason, been suffered to fall. And that, whoever wishes to have his house painted in fresco, must have a painter ready, and place him on the scaffold with the workmen. The latter lay on the mortar, as before directed, and are attentive to spread it very even, to receive the paint. When they have finished one part, they suspend their work, to give the painter time to do his; for if they continued working on, the painter, who cannot go on so fast as they, would find the mortar too dry, and the colours would not incorporate with it. It is absolutely necessary that the plasterer's work should be subordinate to that of the painter; it is sometimes so arranged, that the latter work while the former are gone to their meals; and when in his turn he retires from work, he traces out the part that the plasterers are to cover during his absence, foreseeing how much he shall be able to paint in the course of the day. All these precautions are taken to prevent the too speedy drying of the mortar, and to seize the proper time to lay on the colours while it is fresh.

And in order to make the colour meant to be given to a country-house, dilute in a large tub a sufficient quantity of lime which has been slaked a long time; and also dilute in another tub or pot some ochre, either yellow, red, or any other mineral colour, but always in very clear water; after which, pour a little of the colour into the large tub, and stir it about with a stick, so as to mix it well with the lime; take some of the colour on a brush, and try it on a board or wall; if it is too deep or too light, add fresh lime or colour from the tub, and by repeated trials bring it to the tint that is wished to be given to the house. The colour being made for the body of the house, the frames of the doors and the windows are next to be considered, and a new colour chosen, to distinguish them from the rest of the front. If the body of the house is painted yellow, or of a pale red, the angles and frames may be white or blue; if it is grey, they may be yellow or deep red, and in all cases it will be a very easy matter to find the most suitable colours. It is added, that the plasterers are equal to painting the fronts of houses in a common way; but when builders or proprietors wish to have them decorated in a superior manner, they must call in a painter, whose business it is to do it. The writer asserts that these paintings in fresco are more lively and more brilliant than any other; because the colours are not deadened by size or oil, which do not enter into their composition; their effect is surprising, and may be had at a little expence. And in concluding, it is remarked that the plaster proper to serve as a ground for fresco painting or colouring, is made of one part lime and three parts clean, sharp, washed sand; also that this sort of painting has lately been executed with great success at Woburn Abbey, and some other places in this country. It is not very usual, it is observed, to slake the lime in this

country so long before it is wanted; but it is an excellent practice, especially if it be wood-burnt.

In short, this method of building seems, from its cheapness and durability, and the readiness with which it is executed, to deserve the attention of the proprietors of lands in this kingdom, as the means of raising comfortable houses for their labourers and cottagers, which, from the increased prices of the usual sorts of building materials, are now become seriously expensive in providing.

Some different kinds of buildings of these earthy materials may be seen at Woburn Abbey, the seat of the duke of Bedford, and in some other places.

There are other neat buildings of the cottage kind, formed and raised in this way, which may be seen in *Plate XXII.* in the second volume of the *Farmer's Dictionary*, under the head *Pisé Cottages*, with different elevations, ground plans, &c.

Others likewise built with the common sorts of materials, but which may be raised equally well and conveniently in pisé work, are represented at *figs. 1, 4, and 7,* in *Plate VII.* on *Agriculture*, under the title of *Ornamental Cottages*, in which *figs. 2, 5, and 8,* shew the ground plans, and *figs. 3, 6, and 9,* those of the upper rooms. These kinds of cottages would have an extremely neat and ornamental appearance when erected in the latter of these methods, about the entrances of parks and other kinds of pleasure grounds, as well as near any large country residences, and at the same time be built at an easy expence.

PISEK, in *Geography*, a town of Bohemia, in the circle of Prachotitz, on the Watawa; 20 miles N. of Prachotitz. N. lat. 49° 22'. E. long. 14° 36'.

PISHAMIN PLUM, in *Botany*. See *Indian Date PLUM*.

PISIDIA, in *Ancient Geography*, a province of Asia Minor, N. of Pamphylia, separated by a chain of mount Taurus from Isauria.

PISIFORME OS, in *Anatomy*, one of the bones of the carpus. See *EXTREMITIES*.

PISIG, in *Geography*, a small island in the East Indian sea. N. lat. 2° 20'. E. long. 125° 1'.

PISIGNANO, a town of Naples, in the province of Otranto; four miles S.E. of Lecce.

PISILIS, in *Ancient Geography*, a town of Asia Minor, in Caria, between the river Calbis and the town of Caunus, according to Strabo.

PISINDA, a town of Africa Propria, placed by Ptolemy among those which lay between the two Syrtes.—Also, a town of Asia, in Pamphylia, placed by Ptolemy in that part of this country which was called Carbalia.

PISINGARA, a town of Asia, in the Lesser Armenia, placed by Ptolemy at a distance from the Euphrates towards the mountains.

PISISTRATI INSULÆ, three islands on the coast of Ionia, near Ephesus, called by Pliny Anthinæ, Myonnesos, and Diarrheufa.

PISISTRATUS, in *Biography*, an eminent Athenian citizen, was of noble descent, which he derived from Codrus, the last king of Athens, and inherited a large property from his father Hippocrates. He possessed the natural advantages of a commanding person, a ready elocution, and an uncommon capacity, which he improved with the utmost diligence. Entering into public life, he promoted, by his eloquence, the endeavours of Solon to rousing the Athenians to the recovery of Salamis, and he accompanied that legislator in the successful expedition for the purpose. Naturally ambitious, he ingratiated himself with the lower classes of citizens by the most winning affability, and bound-

less liberality. He relieved their necessities, set open his gardens, and in all his discourses he was the advocate of political equality, and the democratic constitution. Solon and others saw through the artifice of his conduct. Pisistratus one day hastily appeared in the market-place, bleeding from some slight wounds which he had inflicted on himself, and loudly implored the protection of his fellow-citizens from pretended enemies, who were, he said, pursuing his life, on account of his attachment to the democracy. From this time he obtained a guard to attend his person for his security. This guard he soon employed to seize the citadel. He disarmed the multitude, and was now the undoubted master of Athens, while Solon, who had resisted his tyranny in vain, departed from his enslaved country. This event occurred B.C. 560. Though Pisistratus justly incurred the charge of tyranny by the mode which he adopted to acquire his power, he by no means used that power in an offensive way. On the contrary, it is thought, that very few lawful sovereigns ever conducted themselves with greater moderation, or with more regard to the best interests of his countrymen. He did not in the least attempt to abrogate the wise laws of Solon, but invested them with additional authority, and he always expressed great veneration for the legislator, whom he intreated, but in vain, to return to Athens. His supremacy, however, was not as yet well secured, and attempts were made by Megacles to overthrow his power. He succeeded, and Pisistratus was obliged, in his turn, to become an exile, while his property was put up to public sale. Afterwards Megacles permitted him to return, on condition that he would marry his daughter, to which Pisistratus readily acceded, though he refused to live with her, which so far exasperated the father-in-law, that to avoid his vengeance he retired to Eretria. He there occupied himself in preparations for the recovery of his authority by force, which he effected in the eleventh year of his second exile. From this time he continued to govern with the same lenity; but in order to weaken the popular party, he obliged many of the idle inhabitants to leave the city and engage in the cultivation of the surrounding district: and by exacting the tenth of every man's income and produce, he augmented the public revenues, which he expended on magnificent buildings. He also studied to soften the minds of the Athenians by the encouragement of literature. He founded a public library, and made a collection of the poems of Homer, which were at that time scattered in detached parts throughout Greece, and digested them into the order which they have since preserved. Sensible of the odium attaching to a tyranny, he was careful to mask his power under the demeanour of a citizen, and in this way he exercised the sovereignty during the remainder of his life, regarded rather as the father than the oppressor of his country, which scarcely ever enjoyed a longer period of quiet and prosperity. He died in the year 527 B.C., leaving his sons, Hippias and Hipparchus, the heirs of his power. Univer. Hist.

**PISKOI**, in *Geography*, a town of Russia, in the government of Archangel, on the river Mezen; 188 miles E. of Archangel.

**PISMIRE**, in *Zoology*. See **ANT**.

**PISO**, **L. CALPURNIUS**, in *Biography*, surnamed *Frugi*, a Roman of a distinguished patrician family, called the Calpurnian, according to Cicero; though in another passage he represents him as the son of a tribune. The epithet *Frugi* is said to have been given him on the following occasion. When consul in the year 183 B.C., he went into Sicily in order to suppress a mutiny among the slaves, and after the business was effected, bestowing commenda-

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tions from the tribunal on those who had chiefly contributed to the success, he awarded to his own son the prize of a golden crown of three pounds weight, saying, at the same time, that he meant to leave him the gold as a legacy, so that he should receive the honour from his generals, and the reward from his father. For this instance of frugality of the public money, the appellation of *Frugi* was bestowed upon him. In proof of the exactness of the principles of justice by which he was governed, we have the following anecdote. He had always opposed the law for the gratuitous distribution of corn, but when it had been carried by C. Gracchus he came to demand his portion. Gracchus perceiving him standing in the crowd, asked him how he could be so inconsistent as to receive corn by virtue of the law which he had opposed. To this he replied, "It was against my will that you should have the distribution of my property, but if it must be so, I will claim my share of it." Piso was afterwards censor with Metellus Balearicus. He pleaded causes, and was a promoter or opposer of several laws. He left behind him various orations, and was the author of "Historical Annals," which, though written in the meagre simplicity of the times, were reckoned of good authority.

**PISO**, in *Commerce*, a weight used on the coast of Guinea. A seron is  $1\frac{1}{2}$  piso, and a piso is subdivided into  $1\frac{1}{2}$  quintos, 2 agragues, or 4 media-tablas.

**PISOGNE**, in *Geography*, a town of Italy, in the department of the Benaco; 20 miles N.N.W. of Brescia.

**PISOLITE**, in *Mineralogy*, a stony artificial calcareous stone of a grey colour, arising from calx of iron. See **LIME-STONE**.

**PISONIA**, in *Botany*, received that appellation from Father Plumier, in memory of William Piso, a physician of Leyden, the companion of Marcgraf, but whether his master or servant remains in dispute. (See **MARCGRAVIA**.) Piso survived Marcgraf, but of the time of his death, or of his age, we find no account.—Plum. Gen. 7. t. 11. Linn. Gen. 551. Schreb. 739. Willd. Sp. Pl. v. 2. 283. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 2. 333. Brown Prodr. Nov. Holl. v. 1. 422. Juss. 91. Lamarck Illustr. t. 861. Gært. t. 76.—Class and order, *Polygamia Dioecia*, Linn. rather *Heptandria Monogynia*. Nat. Ord. *Aggregateæ*, Linn. *Nyctagines*, Juss.

Gen. Ch. Cal. Perianth inferior, of one leaf, bell-shaped; its limb in five acute, equal, spreading, folded segments, permanent. Cor. none. Stam. Filaments more numerous than the segments of the calyx, usually from six to ten, prominent, awl-shaped; anthers roundish, two-lobed. Pist. Germen superior, oblong; style simple, cylindrical, longer than the calyx; stigma cloven. Peric. Capsule oval, of one cell, without valves, clothed with the permanent pentagonal tube of the calyx. Seed solitary, smooth, oblong.

Ess. Ch. Calyx bell-shaped, five-cleft, plaited. Corolla none. Capsule of one cell, without valves, clothed by the angular calyx. Seed solitary.

Obs. The stamens on one plant, and the pistils on another, are more or less imperfect, so that the genus is, in effect, dioecious, or at least polygamous; but it is one of those which, having no other difference of structure in their flowers, but, on the contrary, the rudiments at least of both organs present in every flower, are best classed by the number of their stamens. In this latter respect however *Pisonia* is uncertain, like its relations *Mirabilis*, *Valeriana*, and *Boerhavia*.

1. *P. aculeata*. Prickly *Pisonia*, or *Fingrigo*. Linn. Sp. Pl. 1511. Ait. n. 1. Plum. Ic. t. 227. f. 1. (Pa-

liuro affinis arbor spinosa, &c.; Sloane Jam. v. 2. 25. t. 167.)—Spines axillary, horizontal. Leaves ovate, acute at each end, smooth. Calyx of the fruit prickly.—Native of the West Indies. A tree whose trunk is as thick as a man's thigh, eight or nine feet high, with weak drooping spinous branches. Leaves nearly opposite, stalked, simple, entire, smooth, pointed, two or three inches long and one broad, deciduous. Flowers appearing before the leaves in dense downy panicles, about the ends of the branches, yellowish-green, bracteated, small, smelling like elder. Fruit club-shaped, its angles beset with numerous, regular, obtuse, prickles, the panicle being enlarged and divaricated.

2. *P. subcordata*. Heart-shaped Fingrigo, or Loblolly-tree. Swartz Ind. Occ. v. 2. 641. Willd. n. 2.—Spines none. Leaves roundish-heart-shaped. Calyx of the fruit dry, its angles prickly in the upper part.—Native of Antigua, St. Kitt's, &c. A tree, with unarmed, smooth, brittle branches. The wood is of little use, whence, according to Swartz, it is called *loblolly*, an appellation given in the West Indies, to a number of trees whose wood is good for nothing. Leaves stalked, opposite, smooth, turning black in drying. Cymes axillary, stalked. Flowers minute, greenish, polygamous. Stamens seven.

3. *P. nigricans*. Black-berried Fingrigo. Swartz Ind. Occ. v. 2. 643. Willd. n. 3. Ait. n. 2. (*P. inermis*; Jacq. Amer. 275.)—Spines none. Leaves ovate, pointed, smooth. Flowers cymose, erect. Calyx of the fruit pulpy, smooth.—Native of mountainous woods in Jamaica and Hispaniola. Swartz. Jacquin says it is frequent about Carthagenia. A small tree, or shrub, ten or twelve feet high, with smooth branches, destitute of thorns. Leaves stalked, opposite, smooth on both sides. Cymes stalked, terminal and axillary, of many small yellowish-green upright flowers, with two or three minute acute bractees at the base of each. Fruit oval, smooth, black, the tube of the calyx which clothes it becoming pulpy as the seed ripens, but there are no prickles upon it.

4. *P. coccinea*. Scarlet-berried Fingrigo. Swartz Ind. Occ. v. 2. 645. Willd. n. 4.—Spines none. Leaves elliptic-lanceolate, smooth. Panicles terminal, loose. Flowers drooping. Calyx of the fruit pulpy, smooth.—Native of bushy places in Hispaniola, flowering in May. Sw. A shrub, or small tree, with smooth, round, unarmed branches. Leaves scattered or opposite, on longish slender stalks, and tapering at each end; paler beneath. Flowers whitish-brown, small, drooping, with three linear bractees at their base. Stamens seven, rarely eight or ten. Fruit oblong, smooth, pulpy, scarlet. We have an authentic specimen of this from Dr. Swartz. If we are right in a specimen in the herbarium of the younger Linnæus, which we presume to be the *nigricans*, that species differs from *coccinea* in having much shorter and broader footstalks, as well as far more numerous and straight transverse veins to the leaves, which latter are obovate, rather than ovate. The fruit is smooth, oblong, in a long-stalked spreading panicle. Probably the stalk is elongated after flowering, as Swartz describes it shorter, in that state, than the leaves.

5. *P. mitis*. Small-thorned Pifonia. Linn. Sp. Pl. 1511. Willd. n. 5. (*P. inermis*; Swartz Obf. 393. Katukava walli; Rheede Hort. Mal. v. 7. 13. t. 17, on the authority of Linnæus.)—Spines axillary, curved. Leaves ovate, downy. Calyx of the fruit downy, without prickles. Native of the East Indies. Koenig. This has the habit of the first species, but the spines are fewer, smaller, and curved. Leaves opposite or aggregate, alternate on the young shoots, ovate, or elliptic-lanceolate, with a blunt point, obscurely veined, clothed, more or less densely, with

short rusty down. Footstalks downy, a quarter the length of the leaves. Flower-stalks axillary, often two together, longer than the leaves, downy, with opposite branches all towards their ends, bearing dense tufts of small downy flowers, with ovate downy bractees. Stamens seven. Panicle of the fruit more lax and spreading. Fruit obovate, clothed with the downy tube of the calyx, destitute of prickles. As we unfortunately have not access at present to the seven latter volumes of the Hortus Malabaricus, we cannot examine into Rheede's synonym, but our specimens having spines, one part of the difficulty, which has so much embarrassed authors, is removed. The Linnæan herbarium has no marked specimen; but the species seems to us perfectly clear in its characters and history. Poret, in Lamarek, has confounded it, under the faulty name of *inermis*, with the *nigricans* of Swartz.

6. *P. grandis*. Superb Pifonia. Brown Prodr. Nov. Holl. v. 1. 422. Ait. n. 3.—“Stem arboreous. Leaves oblong, pointed, smooth. Cymes compound. Flowers polygamous. Stamens from seven to nine. Calyx of the fruit prickly.”—Found by Mr. Brown in the tropical part of New Holland, and brought in 1805 to Kew, where it is kept in the green-house, but has not yet blossomed. We have seen no specimen.

7. *P. villosa*. Broad-leaved Pifonia. Poret in Lamarek Dict. v. 5. 347?—Leaves ovate, obtuse, somewhat downy. Panicles dense, repeatedly branched, downy. Calyx very slightly divided.—Native of the island of Mauritius. Our specimen came from Thouin's herbarium. The bark of the branch is smooth, without thorns. Leaves two or three inches long, and half as broad. Stalked, ovate, obtuse, wavy, thinly covered with fine short pubescence, which perhaps disappears at a more advanced period. Flowers very numerous, in dense, round, stalked, downy panicles, whose copious subdivisions are alternate. Calyx abrupt, club-shaped, downy. Anthers large, reddish. We have seen no fruit. Our only doubt is whether Poret's plant may not be our *mitis*. We have therefore described our own specimen, without borrowing any thing from him, and to this, in either case, the name of *villosa* may remain. Our's has all the appearance of being one of Sonnerat's specimens. As it is the young extremity of a branch, the spines may well be wanting.

The *P. subovata*, Poret n. 4, is an accidental error for *subcordata* of Swartz.

The beautiful BUGINVILLEA of Commerçon, see that article, is very nearly allied to *Pifonia*. Its curiously twisted limb of the calyx, in the ripening fruit, is not represented by Lamarek, though it may have some weight in the generic character.

PISONIA, in Gardening, contains plants of the exotic tree kind for the stove, of which the species cultivated is the prickly pifonia (*P. aculeata*.)

*Method of Culture*.—It is increased by seeds, which should be sown in pots filled with light rich earth, and plunged into a hot-bed of tanners' bark; and when the plants come up, they should be transplanted into separate pots, and plunged into the hot-bed again, where they may remain till autumn, when they should be removed into the stove, and plunged into the bark-bed, and treated in the same manner as has been directed for several tender plants of the same country; in hot weather giving them plenty of water, but in winter more sparingly.

They are too tender to thrive in the open air of this country at any season of the year, they should, therefore, be constantly kept in the stove. They retain their leaves most part of the year in this climate.

The plants afford variety in stove collections of exotic plants.

PISONOS, in *Ancient Geography*, a town of Asia, in Lesser Armenia, on the route from Sebaste to Cocufon, between Ad Prætorium and Melitene, according to the Itinerary of Antonine.

PISRAH, in *Geography*, a town of Hindoostan, in Bahar; 58 miles S.S.W. of Patna.

PISSA, a town of Prussian Lithuania; four miles S. of Stalluponen.—Also, a river of Prussia, which runs into the Pregel, near Inster.

PISSANIZENA, a town of Prussia, in Natangen; 10 miles S. of Marggrahowa.

PISSASPHALTUM, or PISSASPHALTUS, *πίσσασφαλτος*, compounded of *πίσσα*, *pitch*, and *ασφαλτος*, *bitumen*, found in *Natural History*, denotes a native, solid bitumen, found in the Ceraunian mountains of Apollonia: of an intermediate nature between pitch and asphaltum. Its characters are these: the pissasphalta are fluid mineral bodies, of a somewhat thick consistence, dusky, and opaque; of a strong smell, and readily inflammable, but leaving a residuum of greyish ashes after burning.

There are three known species of this genus. 1. A thinner blackish kind, called *oleum terra*, and *petrol*. 2. A thicker black one, called *pisfelæum Indicum*, or *Barbadoes tar*. And, 3. A black and viscous one, called simply *pisfasphaltum* in the shops. See BITUMEN.

Pissasphaltum is as tough and viscous as bird-lime, and of the same consistence when old. It very much resembles the common black pitch, when softened a little by heat; and has been generally thought to have something of the smell of that substance; but this seems to have arisen from its being too frequently adulterated by mixing pitch with it, and the true genuine substance has no other smell than the rank one of all the bitumens, which somewhat resembles that of oil of amber. It is produced in several parts of the world, and there are large quantities of it in Germany, in Persia, and in France. It yields a limpid oil by distillation, which very much resembles the native petroleum, and is too often sold with us under this name, being annually imported in large quantities from those parts of Germany where it is manufactured, and having itself no particular name in the shops of our druggists.

Pissasphaltum was much recommended by the ancients for external use, as an emollient, maturant, and digestive: with this intention it was used in cataplasms, for ripening all sorts of tumours, and against the sciatica and other pains of the limbs. They also had recourse to it for strengthening the limbs, after the reduction of dislocations. It is little used at present, the petroleum being thought very proper to supply its place.

PISSASPHALTUM is also a name given to a factitious substance, compounded of pitch and asphaltus, or the true bitumen Judaicum.

The coarseness of this, the black colour, and the fetidness of the smell, distinguish it from the true asphaltum.

PISSASPHALTUM is also used, by some writers, to denote the Jewish pitch, or simple asphaltum.

PISSSELÆUM, *πίσσαλον*, *oleum Picinum*, or oil of pitch, an obsolete medicament compounded of oil and pitch.

PISSSELÆUM *Indicum*, among *Modern Writers*, denotes a bituminous substance brought from the West Indies, popularly called *Barbadoes tar*.

It is a heavy, thick, and dusky-looking mineral fluid, of the colour and consistence of common treacle, and of a very opaque hue; it is of a disagreeable smell, faintly approaching to that of oil of amber, and is very inflammable. It is found trickling down the sides of the mountains at the

back of several of our plantations in America, and is in great esteem there for coughs and disorders of the lungs. We meet with very little in England that is genuine, several different sophistications of it being in common use, even upon the spot. (See BITUMEN.) It has a strong smell not unlike the common tar, and is not very pleasant to fight or taste. It is accounted a good balsamic, and where the stomach can dispense with it, will do great service in many disorders of the breast, which has also been experienced of common tar.

PISSER, in *Geography*, a mountain of the county of Tyrol; four miles S.E. of Landeck.

PISSEROS, the name of an ointment greatly recommended by Hippocrates in many cases, as in burns, fresh wounds, &c. It was made of oil of roses, bees-wax, and pitch, proportioned so as to give the whole a soft consistence. It was of the nature of our modern black basilicon, and found a good ointment in many cases.

PISSINUM. Pliny says it was customary for the ancients to hold fleeces of wool over the steam of boiling tar, and squeeze the moisture from them, which watery substance was called *pisfinum*.

Ray will have this to be the same with the *pisfelæum* of the ancients; but Hardouin, in his notes on Pliny, thinks the *pisfelæum* to have been produced from the cones of cedars. What use they made of these liquors anciently, is not known; but it may be presumed they were used in medicine, though at present it does not appear they are used at all.

PISSITES, a name given by the ancients to a wine impregnated with the virtues of liquid pitch or tar. To prepare it, the tar was ordered to be washed in sea-water or brine, and afterwards in fresh water many times; and after a tedious preparation of this kind, two ounces of it were ordered to be put to eight gallons of must, which is to be suffered to work together, and the clear liquor to be bottled off.

This was accounted a warm wine, very assistant to concoction, and of an absterfivè faculty, and a good pectoral: on these accounts it was given in disorders of the breast, and in obstructions of the liver, spleen, and uterus, if not attended with a fever; and was a common medicine in coughs and asthmas of all kinds.

PISSOCEROS, a name given by the old naturalists to a substance found very frequently in the hives of bees, and consisting of a mixture of propolis and wax. The ancients were well acquainted with the use of this substance, which was used for stopping up the cracks and chinks in the hives: they mention, indeed, three sorts of matter used by the bees for this purpose; the metys, the pissoceros, and the propolis; but later authors call them all by the general term propolis, the pissoceros and metys being only the same substance, mixed with wax in different proportions. This propolis is a resinous substance, of a soft and viscous consistence, collected from the beds of the poplar and other trees.

PISSOS, in *Geography*, a town of France, in the department of the Landes, and chief place of a canton, in the district of Mont-de-Marsan; 27 miles N.W. of Tartas. The place contains 1338, and the canton 4572 inhabitants, on a territory of 482½ kilometres, in seven communes.

PISSOSIS, a word used by the old writers on medicine for the depraved appetite of young women about the first eruption of the menses, and of some women with child.

PISS-POT BAY, in *Geography*, a bay in the straits of Magellan. S. lat. 53° 14'. W. long. 75° 12'.

PISTACHIA-NUT, in *Botany*, *Gardening*, &c., a well known sort of nut. See PISTACIA.

PISTACHIA, or *Pistach-nut*, a fruit brought from several parts

parts of Asia, chiefly from Aleppo and Persia. When wrapt in all its coats, it is of the size of a green almond; but when stript of all but its shell, it resembles a small nut. The kernel is red without, and green within; its taste is very agreeable.

The word is formed from the Latin *pistacium*, of the Greek *πιστάκιον*, whence, according to Menage, the city Pistacium took its name.

The tree that produces it is a kind of turpentine-tree. See PISTACIA.

The nuts are to be chosen new, heavy, and full; as to those that are broken, such as have kept their colours best are to be preferred; for nothing depends upon the size.

Pistachias have been reckoned aperitive, and proper to give vigour; and used in emulsions, &c. in phthical and nephritical cases. They also enter several ragouts, and are comfited, made into conserves, &c. There is likewise a kind of false pistachia, brought from the Caribbee islands, which some confound with the real ones, though very different, both with regard to the plants that produce them, and their quality. The spurious pistachia plant does not rise above a foot high; nor does the fruit grow on the branches, but is found in pods. The pod sometimes only contains a single nut, which resembles an olive; but usually several; and in that case they are irregular. The substance is white, compact, and heavy.

This fruit is rarely eat raw, because of the ill effects it produces; it is usually roasted or comfited; it is used in ragouts, and to make ratifias.

PISTACIA-Tree, *Black Virginian*, a species of the *hamamelis*; which see.

PISTACIA, in *Botany*, *πιστάκιον* of Dioscorides, a word of doubtful origin. Athenæus attributes it to the Syrians. Forskall gives *fosluk* as the Arabic name of the *Lentiscus*, and Olaus Celsius of the *Pistacia*; hence De Theis supposes *πιστάκιον* a corruption of that word; but surely it is hazarding enough to presume them of one common origin. Rauwolf's *fylic* indeed comes much nearer.—Linn. Gen. 518. Schreb. 683. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 5. 381. Lamarek Illustr. t. 811. (Terebinthus; Tourn. t. 345. Juss. 371.)—Class and order, *Diœcia Pentandria*. Nat. Ord. *Amentacea*, Linn. *Terebintacea*, Juss.

Gen. Ch. Male, *Cal.* Perianth of one leaf, in five deep equal segments. *Cor.* none. *Stam.* Filaments five, capillary, very short, spreading; anthers large, oblong, quadrangular, obtuse, of two cells bursting lengthwise, spreading.

Female, on a separate plant, *Cal.* Perianth of one leaf, inferior, in three deep equal segments, deciduous. *Cor.* none. *Pist.* Germen superior, roundish, somewhat triangular; styles three, erect; stigmas spreading, obovate, thickish, hispid, undivided. *Peric.* Drupa dry, coriaceous, ovate. *Seed.* Nut ovate, smooth.

Eff. Ch. Male, Calyx five-cleft. Corolla none. Female, Calyx three-cleft. Corolla none. Styles three. Drupa dry. Nut single-seeded.

Obs. Linnæus considers the male flowers as constituting a catkin. Jussieu discretely terms it *racemus amentaceus*. The inflorescence is actually a panicle, with a bractea under each of its subdivisions, in both sexes; which is proved by the presence of a true perianth to each flower in each.

1. *P. officinarum*. Pistachia-nut Tree. Ait. n. 1. (Pistacia; Matth. Valgr. v. 1. 248. Bauh. Hist. v. 1. par. 1. 275. Ger. em. 1436. Pistachi, fistic of the Arabians; Rauw. It. 72. t. 9. Terebinthus indica Theophrasti, Pistacia Dioscoridis; Tourn. Inst. 580. Duham. Arb. v. 2. 306. t. 88.)—Leaves simple, ternate, or pinnate; leaflets oval. Fruit ovate, pointed.—Native of Syria, and other

countries in the Levant. Matthioli says the Venetians usually imported the nuts from Syria. The tree has often been raised in this country, and as often lost. It is marked as hardy in Hort. Kew. flowering in April and May. We have had no opportunity of seeing more than a dried specimen, without flowers. The young leaves are ternate, the more advanced ones pinnate; the leaflets elliptical or ovate, pointed, slightly wavy, entire, smooth, except a fine, chiefly marginal, pubescence when young. Their midrib sends off several parallel transverse veins, connected by fine reticulations. Fruit paniced, about an inch long, ovate, with an oblique point, reddish, well known, for the sake of its nut, at our tables. The green internal hue of the kernel is remarkable. Linnæus's history of this plant is so extremely confused, that we have judged it best to follow Mr. Aiton in its name, rejecting the synonym of Boccone, Mus. v. 2. 139. t. 93, which is certainly a female, not a male, plant, though called so by the author, after the old Bauhinian fashion; and it appears to us rather to belong to the next species. The figures we have cited mostly represent three pair of leaflets, with an odd one; the Hort. Kew. describes two pair at the utmost; yet these figures must be authentic. Our plant must be what Linnæus meant by his *P. vera*, but he was imposed upon by a full-grown specimen of *P. Terebinthus*, whence his specific character of *vera* is taken. He was still more deceived by Koehler, with a branch of *Fraxinus Ornus* for *P. narbonensis*. The latter species therefore is best omitted, whatever its synonyms may belong to. We have not materials to arrange all these with any certainty.

2. *P. reticulata*. Net-leaved Pistachia Tree. Willd. Sp. Pl. v. 4. 751. Ait. n. 2. (*P. trifolia*; Linn. Sp. Pl. 1454. Pistacium mas ficulum, folio nigricante; Boec. Mus. v. 2. 139. t. 93? Terebinthus indica major, fructu rotundo; Bauh. Hist. v. 1. par. 1. 278.)—Leaves ternate and pinnate; leaflets roundish, abrupt, somewhat pointed; tapering at the base; strongly reticulated with prominent veins. Fruit roundish-oval, obtuse.—Native of the Levant. Cultivated by Miller, as well as in the French gardens. It is generally taken for the *trifolia* of Linnæus, and perhaps ought to retain that name, but as the leaves are often pinnate, which Linnæus himself remarks, and as they mostly are so in our specimen, we submit to the above change. There seems never to be more than two pair of leaflets, and an odd one; they are all large, coriaceous, broad, rounded, and obtuse; their veins remarkably and strongly reticulated; their base more or less contracted, elongated, or wedge-shaped. When young they are downy at the margin, and elsewhere, like the foregoing. Bauhin represents the fruit as more rounded and obtuse than the common Pistachia, but equally good. His leaves however are much too pointed for our plant, and agree far better with the former; while, on the other hand, the leaves in Rauwolf's cut, cited for *P. officinarum*, to which his fruit belongs, come nearer to the *reticulata*. After all, these plants may possibly be but varieties, and we are much inclined to come to that conclusion. The following are more intelligible, and better defined by authors.

3. *P. Terebinthus*. Common Turpentine Tree. Linn. Sp. Pl. 1455. Ait. n. 3. Woodv. Med. Bot. t. 153. (Terebinthus; Matth. Valgr. v. 1. 101. Ger. Em. 1433. Bauh. Hist. v. 1. par. 1. 279. T. vulgaris; Tourn. Inst. 579. Duham. Arb. v. 2. 306. t. 87.)—Leaves pinnate; leaflets numerous, ovato-lanceolate, acute, recurved. Flowers paniced. Segments of the calyx awl-shaped, longer than the stamens.—Native of the south of Europe and north of Africa. Long known in our gardens. There is a fine female tree at Chelsea garden, near the gate, which,

for want of the male blossoms, can never perfect its fruit. The habit of this species is like the two foregoing, the trunk and branches rugged, and bent in all directions. Leaves of three to five pair of ovate-oblong entire smooth leaflets, with an odd one, all somewhat curved backwards. They are, in our climate at least, deciduous, and appear by Dr. Sibthorp's drawings to be so in Greece. Their red hue, when young, is beautiful. Flowers in large, very compound, panicles. Anthers dull yellow. Stigmas crimson. Fruit scarcely bigger than a large pea, globular, a little compressed, reticulated. Galls of the same shape are found on the leaves, and very large oblong ones, like legumes, are often produced from the young branches, as the old figures represent. The resin of this tree is the Chian or Cyprus Turpentine, generally preferred, for medical use, to what is obtained from the Fir tribe; but it is scarcely to be had without adulteration.

4. *P. Lentifcus*. Mastick Tree. Linn. Sp. Pl. 1455. Ait. n. 4. Woodv. Med. Bot. t. 152. (*Lentifcus*; Matth. Valgr. 1. 99. Ger. Em. 1432. Bauh. Hist. v. 1. par. 1. 283. L. vulgaris; Tourn. Inst. 580. Duham. Arb. v. 1. 354. t. 136.)—Leaves abruptly pinnate; leaflets ovato-lanceolate. Flowers racemose. Segments of the calyx ovate, shorter than the stamens.—Native of the south of Europe. Less hardy than the last, and requiring the shelter of a greenhouse in our climate, being evergreen. In Italy it is very common, flowering about April; as well as in the Levant, where its resin, called mallick, is a well-known article of luxury, and different varieties of this shrub are consequently cultivated with care. It differs from every other known *Pistacia*, in having no odd leaflet, whence Tournefort made it a distinct genus; as well as in its simply racemose inflorescence, and the shortness of the calyx; but there is nothing like a reasonable generic distinction, either in fructification or habit. The wood, called *lignum lentifchinum*, has been supposed to possess some medical virtues, but its chief fame at present is in Portugal, where it serves for toothpicks. These are rather more neat than if made of deal.

*P. oleosa*. Lour. Cochinch. 615, is enveloped in too much uncertainty to be received without examination of specimens.

PISTACIA, in Gardening, contains plants of the exotic, deciduous, tree and shrubby evergreen kinds, of which the species cultivated are the true pistacia tree (*P. vera*); the common turpentine tree (*P. terebinthus*); and the mastick tree (*P. lentifcus*.)

With respect to the second sort, it may be remarked, that the Cyprus or Chian turpentine, which it furnishes, is procured by wounding the bark of the trunk in several places, during the month of July, leaving a space of about three inches between the wounds; from these the turpentine is received on stones, upon which it becomes so much condensed by the coldness of the night, as to admit of being scraped off with a knife, which is always done before sun-rise; in order to free it from all extraneous admixture, it is again liquefied by the sun's heat, and passed through a strainer: it is then fit for use.

Of the third sort, there is a variety which rises to the same height as the preceding; but differs from it in having a pair or two of leaflets more to each leaf, much narrower, and of a paler colour. It is a native of the country about Marseilles, &c.

*Method of Culture*.—The first is capable of being increased by the seeds or nuts procured from abroad, and planted in the spring, in pots filled with light kitchen-garden earth, plunging them in a moderate hot-bed; when the plants appear, a large share of air should be admitted to

them, to prevent their drawing up weak; and by degrees they should be hardened to bear the open air, to which they may be exposed from the beginning of June till autumn, when they should be placed under a hot-bed frame to screen them from the frost in winter; as while young, they are too tender to live through the winter in this climate without protection, but should always be exposed to the air in mild weather; they shed their leaves in autumn, and therefore should not have much wet in winter. In the spring, before the plants begin to shoot, they must be removed each into a separate small pot; and be plunged into a very moderate hot-bed, to forward their putting out new roots. As soon as they begin to shoot, they must be gradually hardened, and placed abroad again.

These plants may be kept in pots three or four years, till they have got strength, during which time they should be sheltered in winter; and afterwards be turned out of the pots, and planted in the full ground, some against high walls to a warm aspect, and others in a sheltered situation, where they bear the cold of our ordinary winters very well, but in severe frosts are often liable to be destroyed. The trees flower and produce fruit, but the summers are seldom warm enough to ripen the nuts.

The third sort is also capable of being increased by laying down the young branches, which, if properly managed, put out roots in one year, and may be cut off from the old plants, and be planted out into separate small pots. These must be sheltered in winter, and in summer placed abroad in a sheltered situation, and treated in the same way as other hardy kinds of green-house plants.

When raised from seeds they should be taken from trees growing in the neighbourhood of the male plants, as otherwise they will not grow. When these plants have obtained strength, some of them may be turned out of the pots, and planted against warm walls; where, if their branches are trained against them, they endure ordinary winters very well, and with a little shelter in severe winters may be preserved with safety.

They are curious and ornamental in different situations.

PISTAKETI, in Geography, a town of the principality of Georgia, in the province of Carduel; 40 miles S.S.W. of Teflis.

PISTANA, in Botany, a name by which some authors have called the *sagittaria aquatica*, or water arrow-head.

PISTATIO, among Pharmaceutical Writers, a word used to express that preparation of simples which consists in covering them with, or including them in, a paste, and sending them to a baker's oven till tender throughout. Squills are sometimes prepared thus.

PISTAZITE, in Mineralogy, named also by some writers Acantieone, Arandalite, and Thallite, is a species of the flint genus: of a pistachio-green, which passes into olive-green and blackish-green. It is found in a massive and crystallized state, under different forms: 1. In six-sided prisms, in which the lateral edges are sometimes truncated and sometimes bevelled; and the terminal edges and angles are truncated. 2. In very oblique four-sided prisms, which have a reed-like aspect; sometimes they are acuminate by four planes, and sometimes bevelled on the extremities, and the bevelling planes are set on the obtuse lateral edges. 3. In acicular crystals; internally it is shining; the fracture is foliated, sometimes narrow and parallel. The fragments are sometimes indeterminate angular, sometimes wedge-shaped and splintery. It occurs in coarse granular distinct conerations. It is translucent, which, in the crystallized varieties, passes into transparent. It is hard, easily frangible, and not particularly heavy. It is found in beds in primitive mountains in Norway, Saxony, France, and Bavaria.

PISTE, in the *Manege*, the track or tread which a horse makes upon the ground he goes over.

The word is French, and literally signifies a *track*.

The piste of a horse may be either *single* or *double*.

If the rider make him go but an ordinary gallop, in a circle, or rather square, he will make but a single piste: if he either make him gallop with his haunches in, or go terra a terra, he will make two pistes, one with the fore-part, another with the hind. And the same if the rider make him passage, or go sideways, either in a straight line, or upon a circle.

PISTEREEN, or PIATRINE, in *Commerce*, the name given in the West Indies to the Spanish pecetas. Pisterreens are also called two-bit pieces; they pass at Jamaica for 1s. 3d. currency, and are worth 10½d. sterling. English shillings and sixpences occasionally pass here as pisterreens and bits.

PISTIA, in *Botany*, so named by Linnæus, from *πίστια*, a channel or watering place, because it inhabits pools and rivers.—Linn. Gen. 467. Schreb. 455. Willd. Sp. Pl. v. 3. 690. Mart. Mill. Dict. v. 3. Juss. 69. Lamarck Illustr. t. 733. (Kodda-pail; Plum. Gen. 30. t. 39.)—Class and order, *Gynandria Hexandria*, Linn. *Monadelphia Octandria*, Schreb. Willd. Nat. Ord. *Inundatae*, Linn. *Hydrocharidæ*, Juss.

Gen. Ch. corrected by Schreber, *Cal.* none. *Cor.* of one petal, unequal, erect, permanent; tube short, closely embracing the germen; limb roundish, somewhat heart-shaped, dilated, pointed, undivided, contracted at each side, in the middle, by a lateral plait directed inwards. *Stam.* Filament round, thick, obtuse, springing almost perpendicularly from the centre of the limb of the corolla, and standing over the pistil, furrounded at the base by a membranous disk, and augmented at each side below, with a dependent fringe, the breadth of the anthers; anthers six to eight, globose, standing in a row round the margin of the filament at its summit. *Pist.* Germen superior, nearly ovate, twice as long as the tube of the corolla, attached to the back of the petal by a thickened longitudinal line, reaching to the origin of the filament; style thick, erect, shorter than the filament; stigma obtuse, somewhat peltate. *Peric.* Capsule ovate, compressed, of one cell. *Seeds* numerous, oblong, depressed, and marked with an umbilicated point at the summit, horizontally inserted into the back of the capsule, where it is attached to the corolla.

1. *P. Stratiotes*. Linn. Sp. Pl. 1365. Jacq. Amer. 234. t. 148. (Kodda-pail; Rheede Malab. v. 11. 63. t. 32. *Plantago aquatica*; Rumph. Amboin. v. 6. 177. t. 74. *Stratiotes*; Alp. Ægypt. 106. t. 108, 109. Velling. Ægypt. 44. t. 45.)—Native of Asia, Africa, and South America, in stagnant waters. Rumphius says it is found only in such as have a muddy bottom, though the plant floats entirely like a *Lemna*, sending down its long, straight, simple, pubescent roots deep into the water, but not so far as the ground. The whole herb consists of a number of broad wedge-shaped obtuse leaves, spreading in the form of a large rose, without any stem, of a coriaceous or rather spongy texture, ribbed, glaucous, with a velvet-like surface; the innermost more erect, convoluted, and downy. *Flowers* white, axillary. The plant is propagated by long lateral runners, each terminating in a bud.

PISTICCIO, in *Geography*, a town of Naples, in *Basilicata*; 12 miles from Turin.

PISTILLUM, in *Botany* and *Vegetable Physiology*, the pistil of a flower, is one of those essential parts of the fructification, necessary to the production of seeds. It is either one or several, situated in the centre of the flower, within the stamens, if the latter be, as usual, in the same flower.

When in a separate one, the pistils are not always central. The idea of Linnæus, of their originating from the pith, and the stamens from the wood, is refuted by anatomical observation, as well as by more correct physiological enquiries. Each pistil consists properly of three parts; the *germen*, or rudiment of the young fruit or seed, which of course is essential; the *style*, various in length and thickness, not always present, as it merely serves to elevate the third part, the *stigma*, which, though indispensably necessary, is, in several cases, seated immediately upon the germen. See *FECUNDATION of Plants*, *GERMEN*, and, hereafter, *STIGMA* and *STYLUS*, or *STYLE*.

Pistils are sometimes obliterated, though more generally transformed to petals, in double flowers, as well as the stamens. In the double-blossomed cherry the pistil is actually changed to a leaf. The style in that case becomes dilated, ferrated, and assumes a deep green colour, turning to a perfect leaf, and the stigma, without much visible change, becomes the gland terminating the leaf, like what is found on the original and proper foliage. Some plants, which increase plentifully by root, are subject to have the pistils weakened and abortive, as in Mint, and *Lilium bulbiferum*; but they do not, in such cases, undergo any transformation. Many whole genera have rudiments only of pistils in some flowers, and of stamens in others, as the *Rhodiola*; such plants being in effect either dioecious, or monoecious. Still more have, intermixed with perfect flowers, whose male as well as female organs are complete, a greater or less number whose stamens only are perfect and effective, their pistils being imperfect, or entirely obliterated. Such is the nature of a great majority of tropical trees, which are therefore, in Linnæan language, polygamous, and strictly belong to the class *Polygamia*; but so much difficulty attends a close adherence in practice to this principle, in consequence of accidental variations, that it is found best to consider no plants as polygamous that have not a difference of structure in their several flowers. See *POLYGAMIA*.

PISTILS FIORD, in *Geography*, a bay on the N. coast of Iceland.

PISTIS, in the *Materia Medica of the Ancients*, a name given to the gum bdellium, particularly to that kind of it which was brought from Arabia, and was of a fine yellowish-white, and in small round drops, or lumps of a roundish shape, and firm consistence.

PISTOCCHI, FRANCENESE-ANTONIO, of Bologna, in *Biography*, one of the greatest itage fingers of the seventeenth century, began to flourish, both as a performer and composer, about the year 1679. He was retained some time at the court of the margrave of Brandenburg as maestro di capella; but late in life, after establishing a school of singing at Bologna, which was afterwards continued by his disciple Bernacchi, he retired to a monastery, where he ended his days.

An oratorio of his composition, which we were so fortunate as to find in Italy, called "Maria Virgine Adolorata," has more merit of expression, and elegance of melody, than any vocal music of the same century. There is no date to this composition; but by the simplicity of the style it seems to have been produced about the end of the 17th century, at which time recitative, freed from formal closes, and in possession of all its true forms, was occasionally extremely pathetic and dramatic; and Pistocchi seems a more correct contrapuntist than the generality of opera fingers whom the demon of composition seizes at a period of their lives, when it is too late to begin, and impossible to pursue such studies effectually, without injuring the chest, and neglecting the cultivation of the voice. This oratorio has neither overture nor chorus. The interlocutors are an angel, the Virgin Mary,

Mary, Mary Magdalen, and St. John. At the termination of this oratorio, which is truly pathetic and solemn, all the degrees of the diminution of sound are used: as *piano, più piano, pianissimo*, equivalent to the *diminuendo, calando, and smorzando*, of the present times.

Pistocchi published six cantatas, with two duets, and two airs, one to French, and one to Italian words, about the year 1699; but we have never been able to find them.

PISTOIA, anciently *Pistoria*, in *Geography*, a city of Etruria, which is an episcopal see, remarkably well built, and from the unusual wideness of the streets and solidity of its edifices, appearing both airy and magnificent. Of these buildings, the principal are the cathedral, the church called "Del Umilla," and the seminary. The dome of the first, the front, or rather the vestibule of the second, and the general disposition of the third, are much admired. Those establishments called seminaries in Italy and France, are not merely academies or schools, but colleges, where the young clergy are instructed in the peculiar duties of their profession, under the inspection of the bishop, during three years previous to the time of their receiving holy orders. Hence each diocese has its seminary, which is always in the episcopal city, and generally contiguous to the bishop's palace. In Pistoia there are two public libraries. The river Ambrone flows close to the town. The surrounding country is not only fertile and well cultivated, but unusually picturesque.

PISTOL, a little fire-arm, borne at the saddle-bow, at the girdle, or in the pocket.

The pistol is said to have taken its name from Pistoia, a city in Italy; where, as Fauchet tells us, it was first made. Borel derives the word from *ffistula, pipe*; the barrel of this piece bearing some resemblance to a flute.

It is said that from harquebusses (see HARQUEBUSS) came pistole, or pistolets, with wheel-locks, the barrels of which were only one foot long, being the harquebuss in miniature. The Germans are said to have used them in France before the French; and the horsemen who received them in the time of Henry II. were called "Pistoliers." They are mentioned as early as the year 1544, under the reign of Francis I. Pistols with a simple spring, instead of the wheel formerly used, fusils and musketoons, are of modern invention; but the inventors are not known. In the year 1658, the use of wheel-locked pistols was not abolished. The wheel-lock was a little solid wheel of steel, fixed against the plate of the lock of the harquebuss or pistol; it had an axis that pierced it in its centre; at the interior end of this axis which went into the lock, a chain was fastened, which twisted round it on the wheel being turned, and bent the spring by which it was held; to bend this spring, a key was made use of, into which the exterior end of the axis

was inserted. By turning this key from left to right, the wheel was made to revolve, and by this movement a little slider of copper, which covered the pan with the priming, retired from being over it; and by the same movement the cock, armed with a flint like the cock of a fusil, was in a state to be discharged, on pulling the trigger with the finger, as in ordinary pistols; the cock then falling on the wheel, produced fire, and communicated it to the priming.

PISTOL Bay, in *Geography*, a bay on the northern extremity of Newfoundland. A late writer (1768) on the probability of a North-west passage, mentions this bay as the only remaining part of Hudson's Bay where this western communication may exist. But this has been examined; and upon the authority of captain Christopher, who failed from fort Churchill in the year 1761, for the purpose of examining Chesterfield's inlet, through which it was supposed there might be a passage to the Western ocean, the reader may be assured that there is no inlet of any consequence in all that part of the coast. Nay, he has, in an open boat, failed round the bottom of what is called Pistol bay, and instead of a passage to a western sea, found it does not run above three or four miles inland. See NORTH-WEST Passage.

PISTOLE, DOBLOON, or *Doblon*, in *Commerce*, a gold coin struck in Spain.

The pistole of exchange, as a money of account in foreign exchange (*i. e.* *dobloon de plata*), was valued at 32 reals of old plate, or 60 reals 8 maravedis vellon; but in commercial transactions within the country, it was reckoned only at 60 reals. After the year 1772, when a new coinage took place, the gold coins current in Spain have been as follow: the *dobloon* of 8 escudos, or quadruple pistole, which passes for 320 reals vellon; the *dobloon* of 4 escudos, or double pistole for 160; the *dobloon de oro*, or pistole for 80; the *escudo* for 40; and the *coronilla*, or *veinten de oro*, for 20.

In 1786, the standard of the gold was reduced to 21 carats for the different *dobloons* and their divisions, and to 20½ carats for the *coronilla*, or *veinten de oro*. The quadruple pistole, or *dobloon* of 8 escudos, coined since 1786, contains 366½ troy grains of fine gold, and is therefore worth 3*l.* 4*s.* 9½*d.* valued in English gold coin; and the subdivisions of the quadruple are in proportion: the allowance for remedy may be valued at 6*d.* in the quadruple. By the assay of the London mint, the weight of the quadruple is 17 dwt. 8 gr., and its fineness 4½ gr. worse than English standard: hence its value in English gold coin is 3*l.* 4*s.* 0½*d.* The value of gold in the Spanish coins is to that of silver as 16 to 1.

The assay, weight, &c. of the different Spanish gold coins, are as follow.

	Assay.		Weight.		Contents in pure Gold.	Value in Sterling.		
	car.	gr.	oz.	dwt. gr.		grs.	L.	s.
Quadruple pistole, or <i>dobloon</i> , coined before 1772	W.	0 1½	0	17 8½	375.4	3	6	5¼
Double pistole, before 1772, single and half in proportion	W.	0 1½	0	8 16¼	187.7	1	13	2½
Quarter pistole, or gold dollar, before 1772	W.	0 2	0	1 3	24.2	0	4	3¼
Quadruple pistole, or <i>dobloon</i> of 1772, the double and single in proportion	W.	0 2¼	0	17 8½	372.	3	5	10
Half pistole, or <i>escudo de oro</i> of 1772	W.	0 2½	0	2 4	46.4	0	8	2½
Quarter pistole, or golden dollar of 1772	W.	0 3	0	1 3	24.	0	4	3
Quadruple pistole of 1801	W.	1 1	0	17 9	360.6	3	3	10
Double pistole of 1801	W.	1 1	0	8 16½	180.3	1	11	11
Pistole, or <i>dobloon</i> of 1801	W.	1 1	0	4 8¼	90.1	0	15	11½
Coronilla, or golden dollar of 1801	W.	1 2½	0	1 3	23.	0	4	1

The impressions on the gold coins of Spain are as follow : on the doubloon or pistole is the head of the reigning king, with name and title ; thus, CAROL. III. D. G. HISP. ET IND. REX, that is, Charles III., by the grace of God, king of Spain and the Indies : reverse, arms of Spain, with the collar of the golden fleece ; legend, in 1740, INITIUM SAPIENTIE TIMOR DOMINI, the fear of the Lord is the beginning of wisdom ; in 1762, NOMINA MAGNA SEQUOR, I follow great names ; in 1763, IN UTROQUE FELIX AUSPICE DEO, happy in both under the divine auspices : there is also at the bottom a letter to mark the place where the piece was coined ; thus M, with a crown over it, signifies " Madrid ;" M with an O over it, " Mexico : " there are also one or two other letters, which vary, being the initials of the moneyer's name. The double, quadruple, and half pistoles bear the same impressions ; but in modern coins, the half pistole is marked " 1 s," 1 feudo, or gold crown ; the single pistole " 2 s," and the others in proportion. The pieces coined between 1700 and 1723 bear no head, but have the arms, and the king's name with DEI GRA. ; on the reverse, a cross surrounded with different ornaments ; legend, HISPANIARUM REX. Those coined before that period are not round, but of an irregular shape, and their impressions are very imperfect.

The doubloon of 1809, coined by Joseph Bonaparte, bears on the front his head, with the legend, JOSEPHI NAP. D. GR. HISP. ET IND. R. I. E. Joseph Napoleon, by the grace of God, king of Spain and the Indies : reverse, arms of Spain with a crown ; legend, IN UTROQUE FELIX DEO AUSPICE, as before. The divisions of the doubloon bear the same impressions.

The coronilla, or golden dollar, bears the same impressions as the doubloon, except with regard to the legends. Those of an ancient date have on one side the king's name, with D. G., and on the reverse HISPANIARUM REX ; whilst those coined in 1786, &c. bear the name and title on the same side ; and there is no inscription on the reverse except initials, as in the doubloon.

In Germany, under the name of pistoles are included the Saxon Augul. d'ors, Prussian Frederick d'ors, Brunswick Carl d'ors, Hanoverian George d'ors, Danish Holstein Christian d'ors, and the pistoles of Hesse, the Palatinate, Hildesheim, and Mecklenburg ; all reckoned at five rix-dollars current ; 35 pieces of each of these sorts of money are to weigh a Cologne mark, and the gold to be  $21\frac{3}{4}$  carats fine ; so that  $38\frac{1}{4}$  pieces contain a Cologne mark of fine silver. An allowance is, however, generally made for a deficiency in weight and fineness, and they are current, in most places, as long as 35 pieces weigh a Cologne mark of gold,  $21\frac{1}{4}$  carats fine : they are then called " passier pistoles." The assay of the George d'or of Hanover is W. o car.  $1\frac{1}{4}$  gr. ; weight, 0 oz. 4 dwt.  $6\frac{1}{2}$  gr. ; the contents in pure gold 92.6 gr. ; and value in sterling, 16s.  $4\frac{1}{2}$ d. The assay of Hesse-Cassel pistole is W. o car.  $2\frac{1}{2}$  gr. ; weight, 0 oz. 4 dwt.  $7\frac{1}{4}$  gr. ; contents in pure gold, 92 ; value in sterling, 16s.  $3\frac{1}{2}$ d. Assay of Mannheim pistole W. o car.  $1\frac{1}{2}$  gr. ; weight, 0 oz. 4 dwt.  $6\frac{1}{2}$  gr. ; contents in pure gold, 92.5 ; value in sterling, 16s.  $4\frac{1}{2}$ d. The George d'or of Hanover bears on the front the king's arms ; legend, GEORGE II. D. G. M. B. F. ET H. REX. V. D. ; reverse, V THALER (5 rix-dollars of account), and under this the date ; legend, BRUNN. ET LUN. DUX S. R. I. A. T. H. ET ELECT. The pistole of Hesse-Cassel bears the head of the reigning prince, with his name and titles, thus : WILHELMUS IX. D. G. HESS. LANDG. HAN. COM., William IX. by the grace of God, landgrave of Hesse, count of Hanau ; reverse, a star, and within it, the legend, VIRTUTE ET FIDELITATE, by courage and fidelity ; in the centre, a lion. Other pis-

toles, coined in 1794, &c. bear on the reverse a lion at rest with standards and military trophies, and over this 5 THALER.

The pistole of Mannheim bears the head of the reigning prince, with name and title, thus : CAR. THE. C. P. S. R. I. A. T. ET EL. that is, Charles Theodore, count palatine, high steward and elector of the holy Roman empire ; reverse a crown, formed by four crowns, and four cyphers of the letters C. T. ; legend, DOMINUS REGIT ME, God directs me.

In various parts of Italy, the pistole is known under the name of doppia.

In Geneva the gold coins are the old pistole of 11 livres 10 fols ; and the new pistole coined since 1752, worth 10 livres current, or 35 florins, with double and triple pistoles in proportion. The assay of the old pistole of Geneva is W. o car. 2 gr. ; weight, 0 oz. 4 dwt.  $7\frac{3}{4}$  gr. ; contents in pure gold, 92.5 gr. ; value in sterling, 16s.  $4\frac{1}{2}$ d. The assay of the new pistole is W. o car.  $0\frac{1}{2}$  gr. ; weight, 0 oz. 3 dwt.  $15\frac{3}{4}$  gr. ; contents in pure gold, 80 ; value in sterling, 14s. 2d.

The assay of the pistole of the Helvetic republic of 1800 is W. o car.  $1\frac{1}{2}$  gr. ; weight, 0 oz. 4 dwt.  $21\frac{1}{2}$  gr. ; contents in pure gold, 106 gr. ; value in sterling, 18s. 9d. The assay of the pistole of Lucerne is W. o car.  $1\frac{1}{2}$  gr. ; weight, 0 oz. 4 dwt.  $21\frac{1}{2}$  gr. ; contents in pure gold, 106 gr. ; value in sterling, 18s. 9d. The assay of the pistole of Soleure is W. o car.  $1\frac{3}{4}$  gr. ; weight, 0 oz. 4 dwt. 22 gr. ; contents in pure gold, 106.8 gr. ; value in sterling, 18s.  $10\frac{3}{4}$ d. The impressions on the pistole of the Helvetic republic are a soldier carrying a standard ; legend, HELVETISCHE REPUBLICK, Helvetic republic ; reverse, a crown of oak, containing 16 FRANKEN : the double pistole is marked 32 FRANKEN. The pistole of Lucerne bears the arms of the city, with the legend, RESPUBLICA LUCERNENSIS ; reverse, a wreath of laurel, containing 12 M 2. GL., and under this the date. The double pistole is marked 24. The pistole of Soleure bears a warrior carrying a standard ; legend, S. URSUS MARTYR ; reverse, arms of the city ; legend, RESPUBLICA SOLODORENSIS, republic of Soleure. The double and half pistoles bear the same impressions.

The assay of the pistole, or doppia, of Piedmont, of 1741 to 1785, is W. o car.  $1\frac{3}{4}$  gr. ; weight, 0 oz. 6 dwt.  $4\frac{1}{2}$  gr. ; contents in pure gold, 134.2 gr. ; value in sterling, 1l. 3s. 9d. The assay of the pistole coined since 1785 (half, &c. in proportion) W. o car.  $1\frac{3}{4}$  gr. ; weight, 0 oz. 5 dwt. 20 gr. ; contents in pure gold, 127.8 gr. ; value in sterling, 1l. 2s.  $7\frac{1}{2}$ d. The assay of the doppia or pistole of Genoa, (the pieces of 2, 4, and 5 pistoles in proportion) is W. o car.  $1\frac{1}{2}$  gr. ; weight, 0 oz. 4 dwt.  $7\frac{1}{2}$  gr. ; contents in pure gold, 93.4 gr. ; value in sterling, 16s.  $6\frac{1}{4}$ d. For other particulars relating to the pistole, both as a money of account and as a coin, we refer to Kelly's Universal Cambist.

N.B. W. every where denotes worse than the English standard.

PISTOLOCHIA, in Botany, a name used by some authors for the plant of which the Virginian snake-root of the shops is the root.

PISTON, a part or member in several machines, particularly pumps, air-pumps, syringes, &c. called also the embolus, and popularly the sucker.

The piston of a pump is a short cylinder of metal, fixed exactly to the cavity of the barrel, or body ; and which, being worked up and down alternately therein, raises the water ; and when raised, presses it again, so as to make it force up a valve with which it is furnished, and so escape through the nose of the pump.

There are two sorts of pistons used in pumps ; the one with

with a valve, which is called a bucket; and the other without a valve, which is called a forcer. See PUMP.

The pistons of air-pumps, syringes, &c. see described under AIR-PUMP and SYRINGE.

PISTORIA, in *Ancient Geography*. See PISTOLA.

PISTRINA, in *Geography*, a town of Servia; 48 miles S.W. of Nissa, and 100 miles E. of Ragusa.

PISTRITZER, a river of Saxony, which runs into the Elbe, near Wittenberg.

PISTYRUS, or PISSIRUS, in *Ancient Geography*, a town in the western part of Thrace, near Mesras, in the territory of which, according to Herodotus, was a lake thirty stadia in circuit.

PISUERGA, in *Geography*, a river of Spain, which springs in the N. part of Old Castile, and runs into the Duero; 10 miles S.W. of Valladolid.

PISUM, in *Botany*, the Pea, an ancient name, whose origin is lost in its antiquity. Some of the learned are content to deduce it from the Greek *πισω*, which means the same thing, and which others derive from *πισσα*, *to stamp*, or *bruise*, because it was customary to take off the skin by such means. De Theis thinks the Celtic *pis*, which is *pisen* in the plural, (he by mistake says singular,) is the common root of this word in all languages. Hence the Anglo-Saxon *pisa*; the English *pea*, *pease*, and still in obsolete Norfolk *peasen*; the French *pois*, and for a pea-field, in old language, *pefiere*; the Italian *piso*; the Welsh *pus*; all synonymous. Linn. Gen. Pl. 374. Schreb. 496. Willd. Sp. Pl. v. 3. 1070. Mart. Mill. Dict. v. 3. Sm. Fl. Brit. 760. Ait. Hort. Kew. v. 4. 302. Juss. 360. Tourn. t. 215. Lamarck Illustr. t. 633. Gærtn. t. 152. (Ochrus; Tourn. t. 219, 220.)—Class and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminosæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, five-cleft, acute, permanent; the two upper segments broadest. *Cor.* papilionaceous. Standard very broad, inversely heart-shaped, reflexed, emarginate with a little point. Wings two, roundish, converging, shorter than the standard. Keel compressed, half crescent-shaped, shorter than the wings. *Stam.* Filaments in two distinct sets; one simple, uppermost; and nine awl-shaped, united more than half-way into a cylinder, split along its upper side; anthers roundish. *Pist.* Germen oblong, compressed; style ascending, triangular, membranous, keeled, its sides bent outwards; stigma united with the upper angle, oblong, villous. *Peric.* Legume large, long, roundish, or compressed towards the base, terminating in a point directed upwards, of one cell and two valves. *Seeds* several, globose.

Obs. *Ochrus* of Tournefort has an oblong scar to the seed; *Pisum* of the same author has a roundish scar.

Ess. Ch. Style triangular, keeled and downy at the upper side. Two upper segments of the calyx broadest. Stamens in distinct sets.

1. *P. sativum*. Common Pea. Linn. Sp. Pl. 1026. Willd. n. 1. Ait. n. 1. (Pisum; Riv. Tetrap. Irr. t. 36. Camer. Epit. 213. P. majus; Matth. Valgr. v. 1. 389. Ger. Em. 1219.)—Footstalks cylindrical. Stipulas rounded and crenate at the base. Stalks bearing several flowers.—Native of the south of Europe. Dr. Sibthorp found it, apparently wild, in various parts of Greece. The root is annual. Stem branched, leafy, smooth, climbing by means of tendrils, and various in height. Leaves alternate, pinnate, of about six, elliptical, nearly opposite, mostly entire leaflets, on a common footstalk, ending in a compound tendril. Stipulas in pairs at the insertion of the footstalk, much larger than the leaflets; rounded, lying over each other, and

copiously crenate, at the base. Stalks axillary, solitary, bearing two or more large, pearly-white, inodorous flowers. Upper segments of the calyx broader, hardly shorter, than the rest; all of them ovate, acute. Legume about a finger's length, smooth.

Of this valuable plant botanists have distinguished several varieties, and gardeners several more. Among the latter are the Marrowfat, the Rounceval, the Hotspur, &c. Among the former are the Sickle Pea of Miller, *Pisum siliqua curva*; Rivin. Tetrap. Irr. t. 37; the Dwarf Pea, *P. nanum* of the same author, t. 38. f. 2; the Sugar Pea, *P. cortice eduli*; Tourn. Inst. 394; and the Rose, Crown, or Topknot Pea, *P. umbellatum*; Mill. Dict. ed. 8. n. 3. Ger. Em. 1220. *P. comofum*; Riv. Tetrap. Irr. t. 38. f. 1. These two last, (the Sugar and the Crown Peas,) agree in the remarkable property of having no hard rigid lining to the legume, so that their pods may be boiled and eaten entire, having moreover a very sweet and agreeable flavour. The flowers of the Crown Pea, at least, have elegant rose-coloured wings, and their stalks grow many together about the top of the stem, rendering the plant very ornamental, and the crop abundant. We have often been tempted to consider this as a distinct species. The notches of the stipulas are, as Miller remarks, about four, being much fewer than in the Common Pea; but we can find no sufficiently clear and permanent specific mark.

2. *P. arvense*. Field, or Grey Pea. Linn. Sp. Pl. 1027. Willd. n. 2. Ait. n. 2. Sm. Fl. Græc. Sibth. t. 687, unpublished. (*Pisum pulchra* species, folio anguloso; Bauh. Hist. v. 2. 297. Morif. v. 2. sect. 2. t. 1. f. 4.)—Leaflets four on a stalk. Stipulas strongly crenate. Stalks single-flowered.—Native of fields in several parts of Europe. Dr. Sibthorp found it near Constantinople; and it is often in some degree naturalized with us. This seems scarcely more than a variety, or perhaps the true original state, of the first species, differing in having rather fewer leaflets, which are more frequently ferrated; solitary purplish flowers, whose wings are of a violet purple; and rather more strongly crenate, often angular, stipulas.

3. *P. fulvum*. Tawny-flowered Pea. Sm. Prodr. Fl. Græc. Sibth. v. 2. 62. Fl. Græc. t. 688, unpublished.—Footstalks cylindrical. Stipulas rounded at the base, sharply toothed. Stalks two-flowered. Legumes shortened.—Gathered by Dr. Sibthorp in Asia minor, probably near Smyrna. This is smaller than the preceding. Leaflets two or four, ferrated. Base of the stipulas, rounded, dilated, very sharply and copiously toothed. Flowers elegant; their standard salmon-coloured, veined with crimson or scarlet; wings of an orange hue; keel of a tawny yellow. Legume scarcely more than an inch long, half-elliptical. Seeds from three to five.

4. *P. maritimum*. Sea Pea. Linn. Sp. Pl. 1027. Willd. n. 3. Ait. n. 3. Sm. Spicil. 8. t. 9. Engl. Bot. t. 1046. Fl. Dan. t. 338.—Footstalks slightly flattened above. Stem angular. Stipulas arrow-shaped. Stalks many-flowered.—Native of the stony sea beach in the north of Europe, and according to Linnæus and Pursh, of North America also. It was first noticed in England between Aldburgh and Orford, Suffolk, when a year of scarcity caused it to attract the observation of the distressed peasantry, who derived great relief from these wild peas, as Caius, Gerarde, and others relate; see Ger. Em. 1250. The long deep perennial roots were also found to be sweet and eatable. The stems are short, procumbent, thickly clothed with greyish glaucous leaves, each composed of six or eight oval, entire, generally alternate leaflets, and ending in a divided tendril. Flowers handsome, variegated with purple and blue, many

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together on longish axillary stalks. *Legumes* linear-oblong; their young *seeds* about as good as the Grey Pea.

5. *P. Ochrus*. Wing Pea. Linn. Sp. Pl. 1027. Willd. n. 4. Ait. n. 4. Sm. Fl. Græc. Sibth. t. 689. (*Ochrus* five *Ervilia*; Ger. Em. 1249. *Aræus niger*; Matth. Valgr. v. 1. 384.) Leaflets two, on winged decurrent footstalks. Flower-stalks single-flowered. — Native of Italy, Spain and the Levant. It was cultivated in the English gardens in Gerarde's time, being a hardy annual, flowering in June and July. The very large broad wings of the *foot-stalks* mark it sufficiently. Each lobe of these bears, at the summit, an oval glaucous *leaflet*, sometimes more, and the middle part ends in a many-branched tendril, winged at the base. *Flower-stalks* axillary, solitary, much shorter than the footstalks, single-flowered. *Corolla* pale buff. *Legume* an inch and an half long, channelled and winged at the back. Of the quality of the peas we have no information.

PISUM, in *Gardening*, comprises plants of the hardy herbaceous kinds, of which the species cultivated are; the common pea (*P. sativum*); the sea pea (*P. maritimum*); and the yellow-flowered pea (*P. ochrus*).

Of the first sort there are two principal varieties, the white and grey; and several sub-varieties, the principal of which are:

*Early Kinds*.—The early golden hotspur; early Charlton hotspur; Nichols's early golden hotspur; the early Charlton; the Reading hotspur; Malters's hotspur; Ormrod's hotspur; early dwarf hotspur; Leadman's dwarf; fan Spanish dwarf; early dwarf frame pea; pearl pea; cluster pea; royal green pea; Ellex hotspur; the dwarf pea; the sugar pea.

*Late Kinds*.—Spanish morotto; nonpareil; sugar dwarf; sickle pea; marrowfat; dwarf marrowfat; rose or crown pea; rounceval pea; grey pea; large grey pea; crooked grey pea; long-bearing pea; green field pea; white field pea; pig pea.

Many of the first sub-varieties are very early, and being low growers, require flicks of three or four feet only in height, and often not so much. New varieties of these are raised almost every year, which, because they differ in some slight particular, are sold at an advanced price, and have frequently the names of the persons who raised them, or the place where they first grew. These varieties are not permanent, and without the greatest care will soon degenerate.

*Method of Culture in the open Ground*.—All the sorts of the first kind are raised from seed sown annually; and as those of one sowing continue but a short time in bearing, several sowings are requisite each season, to continue successions for the table all summer; each sowing to remain where sown, choosing a warm dry border, &c. for the earliest crops; and for the succeeding ones, any of the common quarters, in a free exposure, distant from the shade of trees, &c., but open to the sun.

For the late crops the more moist parts are the best.

The general season for sowing is any time in open weather, from the latter end of October, or in November, until May or June.

But in order to have green peas as early as possible, recourse must be had to the assistance of hot-beds, by the aid of which they are obtained in March and April, and continued till the coming in of the natural ground crops, in the latter end of May or beginning of the following month.

*The early and first general Crops*.—Towards the latter end of October, in November or December, as the weather may be convenient, the earliest crops should be put into the ground. In warm soils and situations it is always advisable to sow a few in the two former months; but in general, and

especially in open exposed grounds, November and December is time enough to begin the principal sowings. For this purpose the earliest Charlton or golden hotspurs are the most proper.

And in order for their reception a warm south border, or some other dry, sheltered, sunny situation should be dug over and prepared; when, in a dry day, drills should be drawn by a line, ranging south and north, to enjoy the greater advantage of the sun's influence, making them an inch and a half deep, and two feet and a half at least asunder; but if designed for flicks, three feet and a half will be a more proper distance. Then the seed should be scattered in evenly along the middle of each drill, rather thickish, as they are liable to accidents from vermin and the season, covering them in regularly with the earth either with a rake or hoe, being careful that they are all equally covered the depth of the drills; and then with a rake lightly trim the surface smooth; which finishes the work.

The peas begin to germinate in a fortnight, if mild weather, and come up in three weeks or a month, but seldom in less time at this season; when the plants are to be managed as directed below.

Another sowing should be performed in three weeks or a month after this; or when the first was sown in October or early in the following month, it is better to repeat the sowing in a fortnight or three weeks, for fear the first should fail; and after this continue sowing once in three weeks or a month all winter in mild weather. But towards spring a principal crop of the Reading and other large hotspurs should be sown; and as the season advances, the sowings be made in more open exposures, and more in quantity than the early ones; and as the spring draws on, the sowings should also be repeated oftener; as from the close of the year till the beginning of April, they should be once in three weeks; and from that time till May once a fortnight, especially as the warm weather increases.

The winter and early spring sowings differ materially in the time they require to germinate: those sown any time in winter are sometimes three weeks or near a month before they appear, while those sown towards spring come up much sooner, in the later spring sowings, often in a very short time.

In the later of the above sowings, some of the dwarf sorts may be introduced; as Leadman's dwarf, both for middle and late crops.

As the plants of each sowing come up, and are advanced two or three inches in height, it is proper to begin the first culture by drawing a little earth with a hoe, or small rake, lightly up to their stems on each side of the different rows to strengthen and forward their growth, repeating the earthing once or twice at proper intervals, as occasion may require, and at the same time cutting up and clearing away all weeds; and when the crops are six or eight inches in height, those designed for support should be flicked.

As the earliest crops are often in danger from the severity of frosts, it is proper, when they are about an inch and a half high, to draw a little fine earth lightly up to their stems in a dry day; it will also be of much advantage to give occasional protection to such crops in severe weather, by covering them lightly with long, light, dry litter, of the strawy kind, or by mats; which, where there is but a moderate quantity in warm borders, may be more easily effected; but this need only be practised in very severe frosts. They must however be carefully uncovered every fine day in temperate weather; and the moment the frost disappears the covering be entirely removed; as they must by no means be kept too close, which would draw them up weak and tender.

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When in blossom, if the weather should prove dry and warm, a few good waterings in the mornings will be beneficial; and when the blossoming plants are advanced a considerable height, if they are then topped, it will promote their podding and coming to perfection.

As to the succeeding crops of the different kinds, all they require is hoeing up the earth to their stems occasionally, and cutting up all weeds when they appear; those designed for support being always staked as soon as they are half a foot high, or a little more, before they begin to fall down on their sides, providing sticks about four or five feet long, and placing one range to each row principally on the fourth or most sunny side of the rows, as the plants naturally incline towards the sun, and of course more readily attach themselves to the sticks.

In the culture of the larger kinds, for successive general crops, such as the marrowfats, Spanish morottos, &c. they may be begun sowing in January, the dwarf marrowfats first; but the three following months are the most proper for the general crops of all the large kinds; a free exposure in the most open quarters being made use of, drawing drills by line, about an inch and a half or two inches deep, and not less than a yard asunder, and when staked, four feet, and for the largest sorts four feet and a half or five feet, in single or double rows.

In these cases the seed should be sown thinly along the middle of each drill, drawing the earth evenly over them with the rake, hoe, or feet, covering them equally the depth of the drills, and raking the surface smooth; these sowings being repeated once a fortnight or three weeks; and as the spring advances once a fortnight, especially from the beginning of April until the end of the following month. Afterwards a few may be sown every ten or twelve days. Late sowings are, however, seldom very fruitful, being often attacked with the mildew; but it is proper to endeavour to have some as long in the season as possible.

When these different crops are come up about three inches high, they should have earth laid up to them on each side of the rows, cutting down all weeds, and repeating the hoeings occasionally according as the growth of weeds may require; and when they are half a foot, or eight or ten inches high, they should have the sticks placed to them; which for these large sorts require sticks six or seven feet high at least, placing them on the sunny side of the rows, as directed above.

For late crops, any of the sorts, either hotspurs or larger kinds, may be continued sowing all May and until the middle or latter end of June; like wise some of the dwarf sorts at a later period for late production. It may be proper to sow larger portions of Rouncivals for the latest crops, on account of their being rather the hardiest to struggle with the summer's heat and drought, and thereby most to be depended on for a late production.

For these crops some of the moistest ground should be chosen; and if the weather should prove very dry and hot, it will be of importance to soak the seed in soft water six or eight hours previous to sowing; or the drills may be well watered after it has been done; either of which will promote their rising expeditiously and more regularly.

It may be observed, in respect to the times of sowing, that it is a good rule, in the different sorts, as soon as one crop appears fairly above ground, to sow another to succeed it of the same kind, so as to have a regular succession of crops following one another in bearing; and if a crop of marrowfats, &c., and another of hotspurs, be sown on the same day, the hotspurs will come into bearing a fortnight

the soonest, and the marrowfats will arrive to a bearing state about the time the others are going out, just in due time to succeed them; which should be attended to in order to have these sorts form a regular succession to each other.

In gathering the crops, both hands ought always to be employed; one to hold the peduncle or footstalk of the fruit, while the other pulls the pods; otherwise the stem or main stalk of the plant, being slender, fragile, and weak, is liable to be broken and destroyed; and the gatherings should always be regularly performed according as the pods fill, never letting them stand to grow old, as they are in the greatest perfection for eating while green, and the plants continue longer in bearing. Crops of peas continue only about a fortnight in full bearing, during which time they furnish a plentiful gathering of pods in their perfection; though in moist showery weather they sometimes continue shooting and flowering three or four weeks; but the produce after the first fortnight is generally inferior both in quantity and quality.

As soon as the crops are past bearing, all the sticks should be taken up and tied in bundles, being set upright in any dry corner for future use.

*Method of Culture in Hot-Beds.*—In order to have green pease as early in the year as possible, recourse must be had to the assistance of hot-beds; and the proper sorts for this purpose are the early dwarf kinds, which by this means may be brought into bearing in March, or the following month.

In this intention, it is rather the best mode to raise the plants first in the natural ground, by sowing in October, or the following month, giving occasional protection from frost; and when one or two inches high, to transplant them into the hot-bed, in January, or the beginning of the following month: as by this practice the luxuriant growth of the plants is so checked by the removal, that they shoot more moderately, and thereby blossom and bear sooner, and more abundantly.

The sowings should be performed in a warm, dry, south border, or in some similar dry sheltered part of light good earth, in a bed of proper dimensions, to have the protection of a frame, &c. in severe weather; sowing them in drills about a foot asunder, in the manner as for the common crops. When they are come up, and advanced a little in growth, in a dry day, some fine earth should be drawn up to their stems, giving suitable protection in bad weather.

But they may be sown on a moderate hot-bed in December, or January, under frames, &c.; and when the plants are up, plenty of free air should be admitted every temperate day, and be defended in the nights from frost, snow, and cutting cold; or, some may be sown in large pots, and be placed in a hot-house, &c. to bring up the plants quickly, for transplanting into the intended hot-bed in January. And they may be sown at once in a hot-bed, at the above periods, to remain for bearing; but it is generally more eligible to have the plants previously raised an inch or two in height, either by early sowing in the full ground, or forwarded under frames, or in a hot-bed, &c. as above, for transplanting into a fresh-made hot-bed for bearing.

In either of the above methods of raising the plants for transplanting, when advanced from one to two inches in growth, or little more, they are proper for planting out into the hot-bed to remain for fruiting.

In mild weather, towards the middle or latter end of January, or the beginning of the following month at furthest, a hot-bed for one or more of the largest three-light frames and glasses should be prepared, which may be either of dung

or tan: the latter, where it can be obtained easily at a moderate expence, is considerably the best for this purpose. It should be made two feet and a half, or a yard thick, and covered with frames and lights; and when in a moderate temperature, the earth be put on for the reception of the plants. Any light, good, dry earth may be employed, which should be laid eight or ten inches thick all over the bed; then in a dry mild day, the plants may be taken up, raising them with their roots as entire as possible, with what earth will readily hang about the fibres; and after drawing small drills in the earth of the hot-bed, from the back to the front of the frame, a foot and a half asunder, and about an inch deep, the plants should be put in the drills, not more than an inch apart, covering in the earth close to their roots and stems, and giving a very light watering, just to settle the earth; after which the lights should be put on, being careful to raise them occasionally at the upper end, to give vent to the steam, &c. And at first planting out, when in sunny weather, if the plants should flag, a moderate shade should be given in the middle of the day, till the plants have taken root, and established themselves.

After this, fresh air must be admitted to the plants daily, in fine weather, to strengthen them, by tilting the upper end of the lights, according to the temperature of the bed and outward air; keeping them close in cold nights, and covering also with mats. Occasional moderate waterings should likewise be given in fine days; and, as the plants advance in growth, a little earth be drawn up to their stems once or twice; repeating the moderate refreshments of water frequently, as the warm season advances; which may be given more freely when the plants are in bloom. And according to the advanced growth of the plants, and increased warmth of the weather, a larger share of fresh air in proportion should be given; and when they are in blossom, if the sun at any time appears too violent for them through the glasses, it is advisable to give a very slight shade an hour or two in the heat of sunny days: likewise, when in full blossom, and fruiting, to admit plenty of free air; even sometimes, in fine days, shoving the glasses entirely off; also still continuing the waterings more abundantly during the time of setting and growth of the pods, and indulging them with the benefit of warm showers of rain. In this way, the plants may be brought to bearing in March or April; and by a succession of two crops, in hot-beds made at three or four weeks' interval, and managed as above, a supply be continued till the natural ground crops come into bearing in May.

Where there is the convenience of fruit forcing-houses, hot-walls, &c. a few of the earliest kinds, either previously raised in young plants an inch or two in growth, as in the hot-bed culture, or, in default of it, the seed sown; and which being in pots, are placed in these departments: or, where there are internal borders of earth, some young plants may be placed therein. The internal moderate heat of the above departments, effected either by bark-beds, &c. or fire, or both occasionally, in a requisite degree for forcing the fruit-trees to early production, forwards them also, so as to have some for gathering in the most early season, in a small proportion.

*Method of Culture in the Field.*—Where designed to raise crops, in order to gather the produce green and young, for the supply of markets, November, or rather December, is soon enough to begin the first sowings, especially in open exposed grounds; a dry light soil being chosen for the more forward sowings. As to the sorts, any of the hotspurs may be used for the forward crops; and for a general crop,

the Reading hotspur is excellent; and after that sort, the Masters's and Ormrod's, &c.; but of the large kinds, the marrowfats and Spanish morattoes should be chosen for the main crops.

The ground for their reception must be prepared by proper ploughing and harrowing; drills are then to be drawn with a hoe crossways the lands, or with a drill-plough lengthways, two feet at least, or two and a half asunder for the early, and three for the larger sorts. As no ticks are intended for these large field crops, having sown the seed, it should be covered in either with the hoe, rake, or harrow; but the hoe or rake will cover them more evenly, and almost as expeditiously. When they come up, they must be kept clean from weeds, by broad-hoeing; but this is sometimes performed in fields by horse-hoeing, for the sake of expedition; which, having hoes fixed in a sort of plough horizontally, is drawn by a horse between the rows, a man holding the plough-shafts to guide it. But as this can only cut down the weeds, a common drawing hand-hoe must be used to earth up the plants: though this is often disregarded in the field-culture, it, however, proves very beneficial to the crops.

In these cases, the rows should be laid down so as to face the sun as much as possible.

*Method of saving Seed.*—In order to save seed, some of each sort should be suffered to stand entirely for that purpose, or some sown of each purposely in different parts; and the whole produce suffered to remain and ripen for seed.

In the latter mode, they should be sown in February, in some open ground, in rows two or three feet asunder, no sticks being required; and, when the plants come up, be kept clean from weeds by hoeing, the earth being laid up to their stems once or twice. When they are in bloom, they should be examined row by row, to see if there be any degenerate sort, which, when present, must be pulled out; or if any improved variety be discovered, to mark it; which is the only method to preserve both the purity of the known sorts, and to procure new varieties. For example: if amongst the hotspurs any large sorts appear, they should be removed directly; also any hotspurs, &c. from amongst the large kinds; and different sorts of any of these from each other. And if any new sort discovers itself, either by flowering earlier than all the rest, or possessing some other singularity, or noticeable merit for culture, it should be carefully marked; the seed being saved separate, to sow separately for furnishing a proper increase.

According as the seeds of the different sorts ripen in July and August, which is discoverable by the pods changing brown, and the seed becoming a little hard, the haulm should be cut or pulled up in dry weather, and exposed in heaps to the sun, turning them every day; and when the seed is become perfectly dry and hard, it may either be threshed out directly, or stacked up in a dry situation, till another opportunity: but when threshed, each sort must be kept separate, and, when properly cleaned, be put up in sacks, with the name of each upon them.

*PIT and Gallows*, in our *Ancient Customs*. See *FUNEA* and *FOSSA*.

*PITS, Brine*, the name given by the people of Worcester-shire and Cheshire, to the wells or pits affording the salt water, out of which they extract the salt.

These waters, though they all contain salt, yet have other things also in them, and these not in small quantity. They all contain a very large proportion of stony matter: this is common to the whole set, but particular substances beside this

this are found in the particular pits. At Northwich, in Cheshire, there are four pits, the water of which stinks very strongly of sulphur, and contains so much vitriol, that it will turn black like ink, with a decoction of galls: yet this is boiled into a very fine and pure kind of salt, common at our tables under the name of basket-salt, and having no such properties.

There is a vast quantity of stony matter precipitated from these pans of brine, in the boiling of them to salt: this is partly saved in small pans set at the side of the boiler, and partly precipitates to the bottom of the pan, where it forms a crust like that at the bottom and sides of our tea-kettles, which the workmen find it necessary to remove every week; but there is no vitriol or sulphur separated. Phil. Transf. N<sup>o</sup> 150.

In the country near where these brine-pits are, the instruments used in boring often bring up fine and hard salt: so that they give proofs of there being rocks of salt in many places.

All along the river Weaver, on each side, the earth affords brine wherever it is opened; but all these are not fit for boiling, many of the pits affording a brine too weak to be worked to any advantage. The very strongest pits sometimes also become at once too weak: this is owing to the irruption of fresh springs into them, and sometimes the river itself makes its way into them, and overflows them with such a quantity of fresh water, that they are utterly spoiled. The brine-pits at Weston, near Stafford, afford a brine that stinks like rotten eggs: this turns instantly to ink with galls, and purges and vomits violently, if taken even in a small quantity. This, in boiling, deposits a white flaky sand, or stony matter, without smell or taste, and the salt is pure and fine.

The pit at Droitwich, in Worcestershire, affords no sand in the boiling, nor any the least sediment of the stony matter at the bottom of the pan, and the salt is the purest of all the others; and by the people of the country it is esteemed the most wholesome, because of its being without the sand.

This and the other pits hereabout, all have the smell of rotten eggs, especially after a little rest, as on the Monday morning after the Sunday's rest. If meat be put to pickle in the brine of these pits, instead of being preserved, it will stink in twenty-four hours, sometimes in twelve, yet they yield the best salt of any inland pits in the world.

The sulphur spaws of Yorkshire, which are very numerous in different parts of the county, all stink violently of rotten eggs; but if well drawn and worked, they would prove as inoffensive as the rest, and only so many weaker or stronger brine pits; and the smell is no other than that of the Cheshire and Staffordshire brine, when it has been left some time at rest. It is remarkable, that though the stony matter is deposited in such vast plenty by the waters of all our salt springs, it is not found in any abundance in those places where salt is made out of sea-sand, as in Lancashire, and some other places; so that it is much more than the natural quantity of spar contained in water that is thus deposited; and indeed it appears from trial, that the brine of our salt springs, in general, contains more than twenty times the quantity of spar that common water does.

This stony matter separates itself from the water before the salt does, and thus it appears in many other waters impregnated with mineral particles. The vitriolic waters all contain ochre and salt, and in all these the ochre separates itself first in the boiling, and then the vitriol; and the stony matter precipitated from common salt springs affords, on an

analysis, the salt called *nitrum calcareum*, in considerable abundance. Phil. Transf. N<sup>o</sup> 156. See SALT.

PITS, *Forcing*, in *Gardening*, such as are formed and constructed on somewhat similar principles to those in hot-houses, stoves, &c., and which are found of very great use and advantage in raising crops of culinary exotics, as cucumbers, and many other sorts;—in forcing common vegetables, as asparagus;—in raising young exotics, as pines and other plants;—or in producing grapes. For these general purposes, pits have been constructed with one single fire, which are capable of producing four different temperatures of heat at the same time. They are, consequently, able to force all kinds of common vegetables, and capable of growing vines, pines, and melons, each in their proper climate, with one fire, and little trouble or expence. See *HORHOUSE* and *STOVE*.

*Pit-Coal.* See *COAL*.

Vegetables have been considered as the materials for the formation of pit-coal; but M. Chaptal observes, that a few forests, being buried in the earth, are not sufficient to form the mountains of coal which exist in its bowels. He thinks some provision, greater and more proportioned to the effect, is requisite, and this he finds only in the prodigious quantity of vegetables which grows in the seas, and which is still increased by the immense mass of those that are carried down by rivers. Those vegetables carried away by the currents, are agitated, heaped together, and broken by the waves; and afterwards become covered with strata of argillaceous or calcareous earth, and are decomposed. It is easier to conceive how these masses of vegetables may form strata of coal, than that the remains of shells should form the greater part of the globe. In confirmation of this theory, Chaptal alleges, the presence of vegetables in coal mines; the impressions of shells and of fish that are found in the strata of coal, and not unfrequently shells themselves; and also the evidence afforded by the nature of the mountains which furnish coal, from which it appears that their formation is sub-marine; for they all consist either of schistus, or grit, or limestone. The secondary schistus is a kind of coal, in which the earthy principle predominates over the bituminous. As the origin of the schistus, on which the texture of the vegetable, and the impression of fish are well preserved, is sub-marine, the same must likewise be the origin of the coal distributed in strata through its thickness. The grit-stone consists of sand heaped together, carried into the sea by rivers, and thrown up against the shores by the waves. The strata of bitumen which are found in these cannot but come from the sea. Calcareous earth rarely contains strata of coal, but is merely impregnated with it; the bitumen forming a cement with the calcareous earth.

Pit-coal is usually found in strata in the earth, almost always in mountains of schistus or grit. The secondary schistus is the basis of all pit-coal, and the quality of the coal mostly depends upon the properties of this basis. When the schistus predominates, the coal is heavy, and leaves a very abundant earthy residue after its combustion. As the formation of the pyrites, as well as that of coal, arises from the decomposition of vegetable and animal substances, all pit-coal is more or less pyritous; so that we may consider pit-coal as a mixture of pyrites, schistus, and bitumen. The different qualities of coal, therefore, arise from the difference in the proportion of these principles. When the pyrites is very abundant, the coal exhibits yellow veins of the mineral, which are decomposed as soon as they come in contact with the air; and form an efflorescence of sulphat of magnesia, of iron, of alumine, &c. When pyritous coal

is set on fire, it emits an insupportable smell of sulphur; but when the combustion is insensible, inflammation is frequently produced by the decomposition of the pyrites; and it is this which occasions the inflammation of several veins of coal. When the schistous, or slaty principle, predominates in coals, they are then of a bad quality, because their earthy residue is more considerable. The best coal is that in which the bituminous principle is the most abundant, and exempt from all impurity. This coal swells up when it burns, and the fragments adhere together; it is more particularly upon this quality that the operation called desulphurating or purifying of coal depends. This operation is analogous to that in which wood is converted into charcoal. In the desulphuration, pyramids are made, which are set on fire at the centre: when the heat has strongly penetrated the mass, and the flame issues out of the sides, it is then covered with moist earth; the combustion is suffocated, the bitumen is dissipated in smoke, and there remains only a light spongy coal, which attracts the air and humidity, and exhibits the same phenomena in its combustion as the coal of wood. When it is well made, it gives neither flame nor smoke; but it produces a stronger heat than that of an equal mass of native coal.

It was long supposed that the smell of pit-coal is unwholesome; but the contrary is now proved. M. Venel has made many experiments on this subject, and is convinced that neither men nor animals are incommoded by this vapour. Mr. Hoffman relates, that disorders of the lungs are unknown in the villages of Germany, where this material of combustion is only used. Coal of a good quality, it is supposed, does not emit any dangerous vapour: but when it is pyritous its smell must be hurtful. The use of coal is generally applicable to the arts in a variety of ways. In Scotland lord Dundonald has erected furnaces in which the bitumen is disengaged from coal, and the vapours are received and condensed in chambers, by means of water, and these condensed vapours afford an ample supply of tar. M. Faujas has carried into execution a similar process at Paris, by setting fire to coal, and extinguishing it at the proper time, so that the vapour may pass into chambers containing water for the purpose of condensing them. This tar is said to be superior to that of wood. (See TAN.) Pit-coal likewise affords ammonia by distillation, which is dissolved in water, while the oil floats above. When coal is deprived by combustion of all its oil and other volatile principles, the earthy residue contains the sulphates of alumine, iron, magnesia, lime, &c. These salts are all formed when the combustion is slow; but when it is rapid, the sulphur is dissipated, and there remain only the aluminous, magnesian, calcareous, and other earths. The alumine most commonly predominates. Chaptal's Elem. of Chemistry, vol. iii.

PIT, *Cock*. See COCK-PIT.

PIT, *Saw*. See SAW.

PIT of a Theatre, all that space between the amphitheatre or galleries, and the theatre or stage; called by the ancients *orchestra*; and by the French, *parterre*.

This being the most commodious part, it was here the Roman senate was placed. It has its name *pit*, in Latin *cavea*, from its being sunk below the level of the stage.

PIT-Fish, or PIT-Fish, in *Ichthyology*, the Dutch name of an East Indian fish, approaching very much to the nature of the European turdus, but that it has no scales; its body is not flat but rounded, and is variegated with blue and yellow spots; its eyes stand very prominent, and the fish is able, at pleasure, to thrust them out or draw them in;

its back fin is prickly: it loves muddy and foul places, yet it is a very well tasted fish. See GOBIUS *Boddaerti*.

PITAMA, or PITAMAHA, in *Mythology*, the name of the god Brahma among the Hindoos; the creative power in their divine triad. See TRIMURTI.

PITAMBER, a name among Hindoo mythologists, given to their pastoral god Krishna, and sometimes also to Vishnu, and Narayana; who are probably the same deity under different names, varied according to the sectarial bias of the devotee.

PITANCIARIUS, PIETANCIARIUS, or *Pictantiarius*, an office in the ancient monasteries, whose business it was to provide and distribute the pittances of herbs and meat amongst the monks. See PITTANCE.

PITANE, in *Ancient Geography*, a town of Asia Minor, in Mysia, watered by the river Evenus, and distant 30 stadia from the mouth of the Caycus.

PITANGUA GUACU, in *Ornithology*, the name of a Brazilian bird of the starling kind, called by the Portuguese there the *bemetre*. It is of the size of the common starling; its beak is long, thick, and of a pyramidal figure; its head broad and flattened; its neck short, which, as it sits, it contracts also, so as to make it appear much shorter; its legs and feet are of a dusky brown; it has a very loud and shrill voice; its head, neck, back, wings, and tail, are all of a brownish-black, with a faint admixture of green; the lower part of the throat, the breast, and the belly, are yellow, the upper part of the throat white; its beak is very sharp-pointed. See LANIUS *Pitangua*.

PITCAIRN, ARCHIBALD, in *Biography*, an eminent physician of the mechanical school, was born at Edinburgh on the 25th of December, 1652. Having received the early part of his education at a private school at Dalkeith, he was removed to the university of Edinburgh; where, having gone through a course of philosophy, he first studied divinity, and then civil law. In consequence of his intense application his health began to suffer, and symptoms of pulmonary consumption appeared, for the removal of which he was advised to travel to Montpellier in France. His health was speedily re-established, and he determined to pursue the study of the law in that university. He found, however, that there was no able professor of that subject in Montpellier; and as he associated with several of his countrymen, who were studying physic, he was induced to change his purpose again, and adopted their pursuit. On returning to Edinburgh, thus prepared with the first elements of all the three learned professions, but undetermined which to follow, he applied himself zealously to the mathematics, in which he made great progress without a master, and was thus led, by discovering, as he supposed, the applicability of mathematical reasoning to medicine, to adopt the latter as his profession.

After studying diligently for some time the collateral branches of medicine, botany, pharmacy, and the materia medica, at Edinburgh, he went again to Paris, where he completed his medical studies, and then settled in Edinburgh, a little before the revolution, where he quickly obtained a great share of practice and an extensive reputation. In 1688, he published a little tract, entitled "Solutio Problematis de Inventoribus," the object of which was to ascertain Harvey's right to the discovery of the circulation of the blood. His extending reputation obtained for him, in 1692, an invitation from the curators of the university of Leyden to the professorship of physic in their school. He accepted this honourable appointment, and made his inaugural speech from the chair, on the 26th of April in that year: the afterwards celebrated Boerhaave was one of his pupils. His  
new

new method of teaching the principles of physiology and pathology on mathematical principles, was, however, not very intelligible by the students, and met with considerable opposition from the members of the faculty; insomuch that, after residing about a year, during which short space he published several dissertations illustrative of the advantages of applying mathematical principles to medicine, he quitted Leyden rather unceremoniously, deserting a chair, in which he had found himself somewhat neglected.

On his return to Scotland in 1693, he married the daughter of sir Archibald Stephenson, an eminent physician in Edinburgh, and was induced again to settle there, when he wrote a valedictory letter to the university of Leyden. His lady did not survive her marriage many years; but she brought him a daughter, who was afterwards married to the earl of Kelly. Dr. Pitcairn died at Edinburgh on the 13th of October, 1713.

In 1701, Dr. Pitcairn republished the Dissertations which he had formerly printed, together with some additional ones; they were dedicated to professor Bellini of Pisto, who had adopted the mathematical doctrines of physiology, and had paid a similar compliment to him in his *Opuscula*. This edition was published in 4to. at Rotterdam, under the title of "Disputationes Medicæ," and contains eight essays. The last edition, which appeared during his life, was published at Edinburgh, a few months before his death, under the same title; but they were reprinted in 1714 at Rotterdam, and in 1715 at Venice, under the title of "Opuscula Medica." After his death, his lectures to his pupils were published, under the title of "Elementæ Medicinæ Physico-Mathematicæ," Lond. 1717; and in an English translation in 1727. All his works have been collected and printed together at Venice, 1733, and Leyden, 1737, in 4to. Pitcairn used to amuse himself occasionally with writing Latin poetry, for which he had no mean talent; and a few of his compositions in this way were printed, with the title of "Poemata Selecta," which are chiefly of the epigrammatic kind. Eloy Dict. Hist. de la Médecine. Hutchinso, Biographia Medica.

PITCAIRN'S *Island*, in *Geography*, an island in the South Pacific ocean, so called by captain Carteret in 1767, after a young gentleman, son to major Pitcairn of the marines, who was lost in the *Aurora*, and who had discovered it. Upon approaching it, it appeared like a great rock rising out of the sea, not more than five miles in circumference, and seeming to be uninhabited. It was nevertheless covered with trees, and a stream of fresh water was observed to run down one side of it. A number of sea birds hovered round it, and the adjoining sea seemed to have fish. It is seen at the distance of more than fifteen leagues, and lies about a thousand leagues W. of the continent of America, in S. lat. 25° 2'. W. long. 133° 21'.

PITCAIRNIA, in *Botany*, received that name from M. l'Heritier, in honour of the late William Pitcairn, M. D. F. R. S. President of the College of Physicians, and a trustee of the British Museum; one of the most amiable and benevolent of men, who employed the leisure of the extensive medical practice, to which his long life was devoted, to the cultivation of a botanic garden at Inlington. There he entertained his friends, and communicated his scientific riches, with the same liberality with which he bestowed the most valuable charity of his medical advice, on those who stood in need of it. In conjunction with the no less distinguished Fothergill, Dr. Pitcairn sent a person to collect on the Alps of Switzerland, many curious plants, previously unknown to English cultivators, the great number of which acquisitions may be seen in the Hortus

Kewensis of the late Mr. Aiton and his son. The name of *Hepetis*, appropriated by Swartz, from Solander's manuscripts, to this same genus, has by common consent been given up, in favour of the claims of so eminent a benefactor to botany as Dr. Pitcairn.—L'Herit. Sert. 7. Ait. Hort. Kew. ed. 1. v. 1. 401. ed. 2. v. 2. 201. Mart. Mill. Dict. v. 3. Swartz Ind. Occ. 578. Willd. Sp. Pl. v. 2. 10. Lamarck Illustr. t. 224. (Hepetis.) Swartz Prodr. 56. Schreb. 798.)—Class and order, *Hexandria Monogynia*. Nat. Ord. *Coronarie*, Linn. *Bromeliæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, in three deep, lanceolate, equal segments, converging into a tube, permanent, its base adhering to the lower half of the capsule. *Cor.* Petals three, oblong, twice the length of the calyx, cohering in the form of a tube, withering. Nectary a scale at the base of each petal. *Stam.* Filaments six, thread-shaped, shorter than the corolla, inserted into the base of the calyx; anthers erect, linear-arrow-shaped. *Pist.* Germen superior, ovate, with three furrows; style thread-shaped, the length of the stamens; stigmas three, twisted together. *Peric.* Capsule ovate, pointed, three-lobed, with three longitudinal furrows, three cells, and three valves; the partitions from the inflexed valves, soon separating at the upper part. *Seeds* numerous, minute, oblong, winged.

Eff. Ch. Calyx in three deep segments, inferior, permanent. Petals three, with a scale at the base of each. Stigmas three, twisted together. Capsule of three lobes, bursting at their inner edge. Seeds winged.

1. *P. bromeliifolia*. Scarlet Pitcairnia. L'Herit. Sert. t. 11. Ait. n. 1. Willd. n. 1. Curt. Mag. t. 824. Schneevoght Ic. t. 11. Redout. Liliac. t. 75.—Leaves fringed with spinous teeth. Flower-stalks smooth, equal to the calyx, longer than the bractæas.—Native of Jamaica, on the sides of shady rocky precipices, where it flowers in the middle of summer. Swartz. It was brought to England before 1781, and is readily increased in the stove by offsets. *Root* perennial, of numerous long stout fibres. *Stem* none. *Leaves* numerous, radical, sheathing, spreading, very long, linear, taper-pointed, channelled, keeled, smooth, moist glaucous, beneath an inch wide; their edges a little recurved, fringed with numerous spinous teeth, especially the outermost; the inner ones are often destitute of teeth, particularly upwards. *Stalk* central, radical, erect, two or three feet high, round, bearing a few toothed bractæas, or small leaves, occasionally at the bottom, the upper part racemose, somewhat pyramidal, sometimes branched, many-flowered. *Partial stalks* alternate, horizontal, simple, single-flowered, smooth, an inch long. *Bractæas* solitary at the base of each partial stalk, lanceolate, taper-pointed, coloured, shorter than the stalk, permanent. *Flowers*, as well as their common and partial stalks, and bractæas, of a beautiful rose-colour approaching to scarlet. *Calyx* an inch long, quite smooth. *Petals* more than twice as long, withering and fading quite in a different manner from the calyx. *Capsule* the length of the calyx, with long-pointed valves.

2. *P. angustifolia*. Narrow-leaved Pitcairnia. Ait. n. 2. Willd. n. 2. Redout. Liliac. t. 76. Curt. Mag. t. 1547.—Leaves fringed with spinous teeth. Flower-stalks downy, longer than the downy bractæas. Calyx downy at the base, twice the length of the flower-stalks.—Native of the island of Santa Cruz, where it was discovered by Mr. Ryan, and sent by him to Kew in 1777. It flowers in the stove in winter. This has narrower and more spinous leaves than the former; much shorter downy partial stalks and bractæas. *Flowers* variable in colour, at least in our gardens, according to the greater or less portion

tion of sunshine, from rose-colour or scarlet to pale yellow. See the Botanical Magazine.

3. *P. latifolia*. Broadish smooth-leaved Pitcairnia. Ait. n. 3. Willd. n. 3. Andr. Repof. t. 322. Curt. Mag. t. 856, excluding the synonym of Redoutè.—Leaves entire; slightly spinous at the base. Flower-stalks smooth, half the length of the smooth calyx.—Native of the West Indies. The leaves are really not broader than those of the *bromeliifolia*, but are distinguished from that, as well as from *angustifolia*, by being quite smooth and entire at the edges, except a few short crowded teeth at the very bottom. The flowers are either scarlet, or pale rose-coloured. Bractæas smooth, variable in length, sometimes equal to the partial stalks, sometimes much shorter. Calyx twice or thrice as long as its partial stalk, and, like that, quite smooth. Mr. Anderson, the very ingenious and scientific gardener of James Vere, esq. of Kensington Gore, has remarked, that this plant may be made to blossom best, by leaving it on the shelf of the dry stove, till the bud appears; after which the pot should be plunged into the bark bed. The flowers are usually produced in July or August.—We have a specimen of this species with a few spinous teeth on one leaf, towards the top. Its bractæas are woolly on their inner, or upper, surface; quite smooth beneath.

4. *P. bracteata*. Great Spiked Pitcairnia. Ait. n. 4. (*P. latifolia*; Redout. Liliac. t. 73, 74. *P. sulphurea*; Andr. Repof. t. 249.)—Leaves entire; slightly spinous at the base. Flowers nearly sessile, crowded. Bractæas as long as the calyx.—Native of the West Indies. It seems to have flowered first in the choice collection of Mr. Evans, of Stepney. Mr. Woodford, late of Vauxhall, sent it to the French gardens. This is a very striking species, whose leaves most agree with the last, with which it has been confounded. It differs from that, and every other species, in its dense spike of very numerous, crowded, nearly sessile flowers, accompanied by large bractæas, reaching as far as the points of the calyx. The corolla is either scarlet, or pale yellow; the latter seems to be occasioned by its coming out in spring, rather than in summer or autumn.

PITCH, in the Arts, a resinous substance, which is the residuum of the distillation of tar. Resin differs from pitch in being the residuum of turpentine, which is obtained from the different species of pine without heat. Tar is obtained by cutting the wood into pieces, and exposing it to the heat by a furnace for the purpose. This accounts for the blackness of the latter, arising from the decomposition of the essential oil by heat. Hence the spirit of tar differs from the spirit of turpentine merely in colour, from the presence of carbonaceous matter. See TAR and TURPENTINE.

Pitch is properly a juice of the wild pine, or pitch-tree; and is conceived to be no other than the oil thereof inspissated, and turned black, farther than in the balsam. For the method of procuring it from the wood of this tree, see PINE. See also TURPENTINE.

The best is that brought from Sweden and Norway. Its goodness consists in its being of a glossy black colour, dry, and brittle.

This is less pungent and less bitter than the liquid tar, (see TAR,) and used only in some external application, as a warm, adhesive, resinous substance. Neumann observes, that when melted with oils, resins, and fats, into ointments and plaster, the pitch is very apt to separate and precipitate. The ancients had a peculiar kind of pitch called *brutia*, which was inspissated to a higher than ordinary degree for certain uses; such as the receiving a proper quantity of bees' wax, to render it the zopilla used in coating the bottoms of ships; which the common pitch could not do,

being of too soft a consistence for this use. Pliny tells us that it was made in this manner: the wood was cleaved and formed into a pile, with proper trenches cut in the earth to receive what run from it in burning. When the pile was lighted, the first thing that flowed into these trenches was a thin fluid liquor like water. Lamp black is the foot of burned pitch: and it is likewise prepared by collecting the foot of pit-coal. See LAMP BLACK.

PITCH, *Burgundy*, is brought to us from Saxony, and is supposed to be a preparation of the same kind with the common resin of the shops, only less divested of the oil, made by boiling the common turpentine till it acquires a due consistence. Upon making an incision into the bark of the "*Pinus abies*," or Norway spruce fir-tree, a clear tenacious fluid issues, which concretes into a resinous substance, known by the name of "*resina abietis*." This, after being boiled in water, and strained through a linen cloth, is called in the Pharmacopœias "*Pix Burgundica*," or Burgundy pitch. But if the boiling of the native resin is continued till the water is wholly evaporated, and wine vinegar is at this time added, a substance of the name of "*Colophonium*" is formed. The greatest quantity of Burgundy pitch is collected in the neighbourhood of Neufchatel, whence it is brought into this country packed in casks. A fictitious sort is made in England, and found in the shops under the title of *common* Burgundy pitch. It may be distinguished by its friability, want of viscidness and unctuousity, and the odour which characterises the genuine sort. Burgundy pitch is of a solid consistence, yet somewhat soft, of a reddish-brown colour, and not disagreeable in smell. It is entirely confined to external use, and was formerly an ingredient in several ointments and plasters. In inveterate coughs, affections of the lungs, and other internal complaints, plasters of the resin, by acting as a topical stimulus, are frequently found of considerable service. See PLASTER.

PITCH, *Jews'*. (See BITUMEN.) Jews' pitch, or asphalt, is black, brilliant, ponderous, and very brittle. It emits a smell by friction; and is found floating on the water of the lake Asphaltites, or the Dead sea. The asphaltites of commerce is extracted from the mine of Anemora, and more particularly in the principality of Neufchatel. M. Pallas found springs of asphaltites on the banks of the Sock, in Persia. Most naturalists, says Chaptal, consider it as amber, decomposed by fire. It liquefies on the fire, swells up and affords flame, with an acrid disagreeable smoke. By distillation it affords an oil resembling petroleum. The Indians and Arabs use it instead of tar; and it is a component part of the varnish of the Chinese.

PITCH, *Mineral*. (See BITUMEN.) This is a modification of petroleum. It is found in France, in Auvergne, at a place called Puits de Lapege, near Allais, over an extent of several leagues. The calcareous stone is impregnated with a bitumen, which is softened by the heat of summer, when it flows from the rocks, and forms a very beautiful stalactites. It forms masses in the fields; and impedes the passage of carriages: the peasants use it to mark their sheep. This stone, when rubbed, emits a filthy smell. Some have asserted that mineral pitch was used to cement the walls of Babylon.

PITCH, *Naval*, *pix navalis*, is that drawn from old pines, ranged and burnt like charcoal. This, with a mixture of tow, or beaten cables, serves for paying over the seams of a ship's sides and decks, after they are caulked, to preserve the oakum from any wet; and likewise over all the surface of the bottom and wales: to pay the two latter it is softened with oil.

PITCH, *Naval*, is also a denomination given to that scraped from

from off the sides of old vessels; and which is supposed to have acquired an astringent virtue, by means of the salt water. It serves to make plasters; though it is certain the apothecaries usually substitute the common black pitch in its stead.

**PITCH**, *Greek*, or *Spanish pitch*, is that boiled in water till it has lost its natural smell; upon which it becomes dry and friable.

The ancients called it *colophony*; from Colophon, a city in Greece, whence great quantities were brought. See **COLOPHON**, and *Burgundy PITCH*, *supra*.

**PITCH**, *Oil of*, *oleum picinum*, is an oil procured from pitch, by separating the aqueous matter that swims a-top of the melted pitch. This, from the great virtues formerly attributed to it, was also called *balsam of pitch*.

**PITCH**, *Ointment of*, is made by melting tar with an equal weight of mutton suet, and straining the mixture whilst hot: this is used sometimes as a digestive, and said to be particularly serviceable against scorbutic and other cutaneous eruptions. See **TAR**.

**PITCH**, *Pills of*, are made of tar mixed with so much powdered liquorice, or other such powdered matter as is sufficient to render it of due consistence for being formed into pills. See **TAR**.

**PITCH of Castro**, in the *Materia Medica*, the name given by Boccone and some other writers to a thick kind of bitumen, found issuing out of the cracks of some rocks near the village of Castro: from whence it has its name: it is famous in the ecclesiastical state for its medicinal virtues.

**PITCH**, in *Building*, denotes the angle or gable end.

If the length of each rafter be three-fourths of the breadth of the building, the roof is said to be *true pitch*. This is used when the covering is of plain tiles.

If the rafters be longer, it is said to be a *high* or *sharp-pitched* roof; if shorter, which seldom happens, it is said to be a *low* or *flat-pitched* roof.

If the length of the principal rafters be equal to the breadth of the building, it is called *Gothic pitch*. This is used when the covering is of pantiles.

If to rule as a pediment, it is said to be *pediment pitch*. The perpendicular height of this pitch, is equal to  $\frac{3}{5}$ ths of the breadth of the building. This pitch is used when the covering is lead.

**PITCH**, in *Music*, implies the elevation or depression of the general scale. There is no term more common among musicians,—who have the Roman pitch, the opera pitch, the organ pitch, the concert pitch. By the first is understood a *low* pitch; by the second, the *true* and most general pitch; by the third, a *high* pitch; as almost all church organs are pitched very high by the builders, we believe, to save metal; of which more is necessary for a long than a short pipe of the same diameter: and by the fourth, a varied pitch, according to the state an instrument is found in by persons who had never met before.

To **PITCH a Camp**, in *Military Language*, signifies to take a position, and encamp troops upon it according to the principles of *castrametation*; which see. See also **CAMP**.

To **PITCH a Tent**, is to place a certain prescribed quantity of canvas upon poles, so as to afford a temporary cover against the inclemency of the weather, for one or more officers or private soldiers. In order that the men may be expert in pitching or striking tents, they should be practised whilst in camp in both operations.

**PITCH**, in *Rural Economy*, a fork full of hay, corn, or straw, or as much as is raised to the load, stack, or mow, at one time.

**PITCH-Fork**, a sort of fork with two prongs, which is

in use for pitching different substances, as hay, corn, straw, &c., to the cart, mow, stack, or other places; and which is usually made larger and longer in the handle than the common hay fork.

**PITCH-Ore**, in *Mineralogy*, a species of the genus Uran, is of a velvet-black colour, or dark greyish-black, which inclines to iron-black. It occurs generally massive, and disseminated: internally it is shining, inclining to glistering, and its lustre is resinous. The fracture is imperfect and flat: the fragments indeterminate angular, and sharp-edged. It occurs sometimes in thick and curved lamellæ; sometimes in coarse and distinct concretions, resembling red hematite. In the streak, neither colour nor lustre is changed. It is soft, brittle, and heavy. The specific gravity is variously given: by Guyton it is said to be 6.38; by Haüy, 6.53; and by Klaproth it is said to be 7.5. It is infusible, without addition, before the blowpipe. With soda or borax it forms a grey, muddy, slaggy-like globule; with phosphoric salts it makes a transparent green bead. It dissolves imperfectly in the sulphuric or muriatic acids, and from this solution, which has a pale orange-yellow colour, the uranium is precipitated brownish-red by prussiat of potash, and yellow by the alkalies. According to Klaproth its constituent parts are,

Uran	86.5
Black oxyd of iron	2.5
Sulphurated lead	6.0
Silica	5.0
	—
	100.0
	—

By the analysis of other chemists it is said to contain only uranium and iron, but neither sulphurated lead nor silica; and in another specimen were found sulphur and a small portion of copper. It is found in veins in primitive mountains with lead and silver ores. It is usually accompanied with lead-glance, copper-pyrites, iron-ochre, calc-spar; sometimes with cobalt-glance, red cobalt-ochre, silver-glance, uranium-mica and uranium-ochre. It is found in several parts of Saxony, Bohemia, and Norway, and is distinguished from brown-blende by colour, specific-gravity, fracture and streak; from wolfram, by its streak and fracture.

**PITCH-Tree**, in *Botany*. See **PINE-Tree** and **PINUS**.

**PITCHED**, in *Sea Language*. They say the mast is pitched, when it is put or let down into the step; also the mast is pitched too far aft, when placed too near the stern. When a ship falls with her head too much into the sea, or beats against it so as to endanger her top-masts, they say, she will *pitch her masts by the board*.

This motion may proceed from two causes; the waves which agitate the vessel, and the winds upon the sails, which make her lurch to every blast thereof.

**PITCHER**, in *Agriculture*, the labourer or person who is employed in pitching.

**PITCHET**, in *Geography*, a town of Upper Siam; 40 miles S. of Porfeloue.

**PITCHIN**, a town of Persia, in the province of Mekran; 100 miles W. of Kidge.

**PITCHING**. See **PAVEMENT**.

**PITCHING**, in *Seaman'ship*, the inclination or vibration of the ship lengthwise about her centre of gravity; or the motion by which she plunges her head and after-part alternately into the hollow of the sea. This is a very dangerous motion, and when considerable, not only retards the ship's way, but endangers the masts and strains the vessel. This motion proceeds from two causes; viz. from the vessel's improper construction, or the ill arrangement of her cargo. See **SHIPBUILDING**.

**PITCHING-Pence**, a duty, commonly of one penny, paid for pitching or setting down every sack of corn, or pack of merchandize, in a fair or market.

**PITCHSTONE**, in *Mineralogy*, a species of the clay genus, of which the colours are black, green, brown, red, and sometimes, but rarely, grey. Of the black, there are the greenish, greyish, and brownish-black. From greenish-black it passes through blackish-green into mountain-green, asparagus-green, leek-green, olive-green, and oil-green. From olive-green it passes into liver-brown, yellowish and reddish-brown, and again into light-blood and brick-red. The varieties of the grey are smoke and dark ash-grey, and sometimes a kind of grey which passes into brown. It has sometimes a blueish colour. Its colours are not lively, but always somewhat deep and muddy, or rather mixed with grey and brown. It is generally uniform, and it seldom happens that several colours occur together. It is found almost always massive, in great beds and rocks. Internally its lustre is shining, sometimes splendid, sometimes glistening, and intermediate between resinous and vitreous, yet more inclining to the first. The fracture passes from the large conchoidal into the coarse splintery and coarse grained uneven. The fragments are indeterminately angular, more or less sharp-edged. It occurs sometimes in coarse distinct concretions, and the surface of the concretions is somewhat bent; also in prismatic generally wedge-shaped distinct concretions, of which the surface is smooth. It is commonly translucent in a small degree; the black variety is only translucent on the edges. It is brittle; easily frangible, and not very heavy. The specific gravity of the Saxon pitchstone is about 2.3. Before the blowpipe it is fusible without addition. The black variety, heated to 21° of Wedgwood's pyrometer, swelled a little, its colour was slightly altered, the surface glazed, and internally it was porous; at 31° it was softened; at 65°, the intumescence was more considerable; and at 100° it was still vesicular, but more compact. The blackish-green variety found at Arran becomes black, is much rent, and internally porous at 23°; at 55° it formed a porous enamel; at 70° it became perfectly white and still porous. The pitchstone of Meissen, by analysis, gave of

Silica	73.00
Alumine	14.50
Lime	1.00
Oxyd of iron	1.00
Oxyd of manganese	0.10
Natron	1.75
Water	8.50
	<hr/>
	99.85
Loss	15
	<hr/>
	100.00
	<hr/>

It occurs in beds in the newer porphyry formations, and in beds and veins that belong to the newest stoz trap formation. It is found in great quantity in the electorate of Saxony, particularly in the neighbourhood of Meissen, also in Hungary, as at Tokay and Schemnitz; in some of the islands of the Archipelago, where it was first observed by Mr. Hawkins; and at Glamocard in the island of Skye. It was first discovered about sixty years ago in the neighbourhood of Meissen in the electorate of Saxony, and was named pitchstone from the striking resemblance which several of its varieties bear to pitch.

**PITCHT, SHOULDER.** See *SHOULDER Pitcht*.

**PITCHY Iron-Ore**, in *Mineralogy*, a metallic fossil, of a very deep reddish-brown, which sometimes passes into

black. It occurs massive with a rough surface, owing to a covering of iron-ochre. Internally it is glistening, and its lustre is semi-metallic, passing into resinous. The fracture is compact, and sometimes foliated. It is opaque, not easily frangible, and brittle. Its specific gravity is nearly 4. It melts very easily into a black enamel before the blowpipe; and its constituent parts are, phosphoric acid, oxyd of iron, and oxyd of manganese. It is found at Limoges in France.

**PITEA**, or **PITHEA**, in *Geography*, a sea-port town of Sweden, in East Bothnia, situated on a small island at the mouth of a river of the same name: joined to the continent by a wooden bridge. The streets are parallel, and the church is at a considerable distance from the town. It has a commodious harbour and a good school. It was first built in 1621 by Gultavus Adolphus, three miles from its present site higher in the country; but in 1666 this town was destroyed by fire, and the present town was built in its present situation. N. lat. 65° 23'. E. long. 21° 22'.

**PI-TEOU**, a small island near the coast of China. N. lat. 25° 20'. E. long. 119° 14'.

**PITESZTI**, a town of Walachia; 50 miles N.W. of Bucharest. N. lat. 44° 57'. E. long. 24° 49'.

**PITH**, in *Vegetable Physiology*. See **MEDULLA**.  
**PITHECALOPEX**, the *Semivulpa*, or *Ape-fox*, in *Zoology*, a name given by Aldrovandus and some others to that strange American animal which we call the opossum.

The name is compounded of that of the fox and the ape; of the natures of both which animals it is supposed by some to participate.

**PITHECON PORTUS**, in *Ancient Geography*, a port of Africa, in Libya, near Carthage.

**PITHIECUSSÆ**, islands of the Tyrrhenian sea, near the coasts of Campania.

**PITHIAS**, or **PITHITES**, with some writers, a sort of comet, or rather meteor, in form of a tub. Of these it is said there are divers kinds, viz. some of an oval figure, others like a tun or barrel set perpendicular, and some like one inclined or cut short off; others having a hairy train or bush, &c.

**PITHING**, the name of an operation performed for killing animals suddenly and without pain. This is effected with a narrow doubled-edged poniard passed in between the skull and first vertebra of the neck: in this way the medulla oblongata is divided, and the animal instantaneously deprived of sensibility. This operation was performed by Mr. Cline junior, assisted by Mr. Brodie and Mr. Chft, on a camel that had been the subject of Mr. Home's experiments. (See *Phil. Trans.* vol. xevi. p. 359.) In the common mode of pithing cattle, the medulla spinalis only is cut through, and the head remains alive, which renders it the most cruel mode of killing animals that could be invented. See *Dr. Dugard's Experiments*, published in the Board of Agriculture's Report for Shropshire, by Joseph Plumley, M. A. p. 246.

**PITHIVIERS**, in *Geography*, a town of France, and principal place of a district, in the department of the Loiret; 21 miles E.N.E. of Orleans. The place contains 3071, and the canton 15,275 inhabitants, on a territory of 302½ kilometres, in 22 communes. N. lat. 48° 11'. E. long. 2° 24'.

**PITHOU**, **PETER**, in *Biography*, a magistrate distinguished for his integrity and erudition, was born in 1539 at Troyes, in Champagne. He received a good education, after which he studied the law as a profession. When called to the bar his natural diffidence so completely embarrassed him, that he found it necessary to renounce that branch of his profession. Being of the reformed religion he had nearly been sacrificed

sacrificed at the horrid massacre of St. Bartholomew's day, which probably had such an effect upon his mind, naturally timid, that in the following year he conformed to the Catholic church, and soon after obtained the office of attorney-general in the chamber of justice in Guienne. When Gregory XIII. had issued a brief against the ordinance of Henry III., concerning the council of Trent, Pithou published a memoir, in which he developed the secret purposes of the brief, and vigorously defended the cause of his king and country. After Henry IVth's conversion, as it has been called, he used his best endeavours to reduce the city of Paris to allegiance. He was one of the writers of the "Catholicon d'Espagne," a satire which proved very effectual in throwing ridicule upon the Spanish party. He also published a little work, which he pretended was a translation from the Italian, entitled "Raïsons pour lesquelles les Evêques de France ont pu de droit donner l'Absolution à Henry de Bourbon," which was several times printed, and which made many converts to the royal cause. He died in the year 1596, at the age of 57. He is represented by De Thou as one of the first men of the age, as well for probity, candour, and real piety, as for the extent of his learning, the soundness of his judgment, and his political wisdom. He had a most intimate acquaintance with every thing relative to French history and antiquities, and his profound knowledge of the civil law, in which he was scarcely inferior to Cujas himself, under whom, in his youth, he had studied. The works of this gentleman are, "Traité des Libertés de l'Eglise Gallicane," in four vols. folio, and which is thought to be the basis of all that has been written on the same subject: "A commentary on the Customs of Troyes," and other tracts on civil and canonical jurisprudence. He published, in 1609, a large collection of "Opuscules," also editions of several monuments of antiquity, chiefly relating to the history of France. He had collected a curious and very valuable library, rich in MSS., which by his will he directed to be sold only to a single purchaser acquainted with its value; this precaution, however, did not prevent its dispersion. By his deep and extensive erudition he acquired the title of the French Varro, and his name was not less celebrated abroad than in his own country. Gen. Biog.

PITHOU, FRANCIS, brother of the preceding, born in 1544, was likewise brought up to the law, and exercised the office of attorney-general to the chamber of justice, established by Henry IV. to check the frauds of the financiers. He assisted at the conferences of Fontainebleau, and was one of the commissioners for regulating the boundaries between France and the Low Countries. After this he retired, passing his life in study, emulating his brother in the variety and depth of his learned researches. He died in 1621. He took a part in most of his brother's publications, and especially contributed to the elucidation of the "Body of Canon Law," printed at Paris, in two vols. fol. He was author likewise of several works, of which the chief are, "La Conférence des Lois Romaines avec celles de Moyse;" an edition of the "Salic Law," with notes; "Traité de la Grandeur et Droits du Roi et du Royaume de France." He published an edition of the "Antiqui Rhetores Latini," 1599. He discovered "Phædrus' Fables," which he published in conjunction with his brother. The names of the two brothers are very celebrated among men of letters. A full and exact catalogue of their several publications is prefixed to their works in Latin, printed in 1715. Moreri.

PITHYUSA, in *Botany*, a name used by many authors for a small species of spurge.

PITI, in *Geography*, a town of Thibet; 204 miles S. of Latac.

PITIES, in *Commerce*, the only money of the natives of the isle of Java, which is a small coin containing four parts of lead and one of tin; 25 of these pass for two duysts, each duyst being a fourth part of the copper coin, called the silver.

PITIGLIANO, in *Geography*, a town and fortress of Etruria; 23 miles E.N.E. of Orbitello.

PITHEMPO, a mountain of Asia, which bounds Thibet to the north-west.

PITINUM, in *Ancient Geography*, a town of Italy, in the territory called by Pliny "Pitinas Ager," on the other side of the Apennines, and watered by the river Novanus. Ptolemy assigns this town to the Umbrians who inhabited the territory N. of the Tuscans.

PITISCUS, SAMUEL, in *Biography*, a learned philologist, was born at Zutphen in 1637. He studied under J. Fr. Gronovius at Deventer, and afterwards went through a course of theology at Groningen. When he had completed his education, he was made master of the school at Zutphen, and, in 1685, he was promoted to be rector of the college of St. Jerom at Utrecht. He died at a very advanced age at Utrecht, in the year 1717. He was author of "A Latin and Dutch Dictionary;" but his principal work was "Lexicon Antiquitatum Romanarum," in two vols. fol. the labour of ten years of his life; a performance well known to the learned world. He also gave a new and improved edition of the "Roman Antiquities" of Rosin, and of Pomey's "Pantheon Myisticum."

PITIVILCO *la Baranca*, in *Geography*, a town of Peru, in the diocese of Lima; 28 miles N.N.W. of Guaura.

PITKEATHLY or PITCAITHLY, a village in the parish of Dumbarry, and county of Perth, Scotland, is seated in a sequestered corner of the rich vale of Stratherne, at the distance of four or five miles from Perth. It has been long celebrated for its mineral springs, and of late years has become a place of very fashionable resort. In the efficacy of the waters for the cure of scrofula, scurvy, gravel, and complaints in the stomach and bowels, Pitkethly wells are generally considered equal, if not superior, to any in North Britain; and the village yields to none in beauty and agreeableness of situation. There are here five distinct springs of different degrees of strength, but all partaking of the same qualities. The chief mineralizers are muriate of soda (common salt) and muriate of lime, with a portion of chalk and Paris plaster held in solution. An account of these waters, and of their medicinal uses, was published in the 62d volume of the Philosophical Transactions. The period of their discovery cannot be ascertained; as even tradition is silent upon the subject.

The parish of Dumbarry is about four miles in length and three in breadth. The soil is extremely fertile, and the surface finely diversified with level and rising grounds, wood, and water. The river Earn runs through the middle of the parish; and on one side it is bounded by the hill of Mordun or Moncrieff, the view from which is characterized by Pennant as "the glory of Scotland." The bridge over the Earn here is of great antiquity, and is kept in repair by the magistrates of Perth. Carlisle's Topographical Dictionary of Scotland, vol. i. 4to. Beauties of Scotland, vol. iv.

PITLAND, a town of Hindoostan, in Guzerat; 18 miles N.E. of Cambay.

PITLAR, a town of Russia, in the government of Tobolsk; 48 miles S. of Obdorskoi.

PITLAWAD, a town of Hindoostan, in the circar of Banswalch; 12 miles S. of Tandla.

PITOE, a town Thibet; 24 miles W.N.W. of Latac.  
PITON POINT, the S.W. point of the island of St. Lucia.

PITOT, HENRY, in *Biography*, a mathematician and engineer in the 18th century, was descended of a noble family of Languedoc, and born in the year 1695. His genius inclining him to the mathematical sciences, he made himself a proficient in them without the aid of a tutor. At the age of twenty-three he went to Paris, and became intimately acquainted with Reaumur. In 1724 he was received into the Academy of Sciences, of which he was elected a pensioner not many years afterwards. He was author of a highly esteemed work, entitled "The Theory of working Ships," 1731, which was so highly esteemed, that on account of it, he was elected a member of the Royal Society of London. In 1740, the states-general of Languedoc gave him the appointment of principal engineer to the province, and also that of inspector-general of the famous canal, which forms a navigable junction between the Mediterranean sea and the bay of Biscay. "Many monuments of his genius," says his biographer, "which will transmit his name with honour to posterity, may be seen in different parts of Languedoc; and, in particular, a noble plan designed and executed by him for supplying Montpellier with water from sources at the distance of three leagues, which has deservedly excited the admiration of travellers. Out of respect to his merits, the Royal Academy of Sciences at Montpellier inscribed his name in the list of their members, and the king honoured him with the order of St. Michael." He died in 1771, at the age of 76, esteemed for his probity and disinterestedness, and highly respected for his science and ingenuity.

PITQUIN, in *Geography*, a town of New Mexico, and capital of the province of Sonora; 900 miles N.W. of Mexico. N. lat. 29° 56'. W. long. 112° 12'.

PITRIOWIN, a town of Austrian Poland, in Galicia; 32 miles S.W. of Lublin.

PITRIPETI, in *Mythology*, a name of the Hindoo deity Yama, who corresponds with the Pluto of western mythologists. See YAMA.

PITRIS, a class of beings with the Hindoos, to whom reverence is paid in their sacrificial ceremonies. They sometimes seem to bear the character of patriarchs, or sages of former days, and at others the moon is assigned for their habitation. The word often occurs in Hindoo books, but apparently without any precise signification attached to it. In the institutes of Menu, they are thus described. "The Pitris, or great progenitors, are free from wrath; intent on purity; ever exempt from sexual passions; endued with exalted qualities: they are primeval deities, who have laid arms aside." "From the Rishis come the Pitris, or patriarchs," &c. ch. iii. v. 192. 200. See RISHIS.

PITSCHEN, or BITSCHEN, in *Geography*, a town of Silesia, in the principality of Brieg; surrounded with walls, and containing two churches and a college; 30 miles N.E. of Brieg. N. lat. 51° 8'. E. long. 18° 15'.

PITSHAN, a town of Little Bucharria; 30 miles E.N.E. of Tourfan.

PITSYLVANIA. See PITTSYLVANIA.

PITT, CHRISTOPHER, in *Biography* an English poet, son of a physician, was born at Blandford, in Dorsetshire, in the year 1699. He was educated in Winchester school, where he was distinguished for his assiduity in study, for his taste as a general scholar, and as a writer of English verse. On leaving Winchester, he was elected to New college, Oxford, and as an acknowledgement of the kindness of the

electors, he presented them with two manuscript volumes of poems, of which one was miscellaneous, and the other contained a complete version of Lucan's Pharsalia. He was intended for the church, and after three years residence at college, he was presented, in 1722, to the rectory of Pimperm, in Dorsetshire, to which place he retired after a further continuance of two years at Oxford, when he had taken his degree of M.A. Here he passed the remainder of his life in an easy situation, maintaining a social and very friendly intercourse with many persons of rank and literary eminence. He died in 1748, in the 49th year of his age, generally respected and beloved. In 1727, he published a volume of Miscellaneous Poems; after which he produced a translation of Vida's Art of Poetry, which possesses much of the elegance and high polish of the original. His success in this department of literature encouraged him to undertake the task of translating Virgil's *Æneid*, which he completed in 1738, and published in two vols. 4to. in 1740. "This translation," says his biographer, "if Dryden's had not existed, would have been considered as a very valuable addition to the mass of English poetry; and even in competition with that work, it may sustain itself by its different merits." It is certainly much more exact to the original, not only in meaning, but in that polish and refinement, which is so often violated by the coarseness of Dryden. It is also by no means deficient in strength and vigour; but it cannot boast of those happinesses of expression, that glow and elevation, which in the best passages of Dryden give the stamp of original genius. Pitt's translation, however, has taken a firm hold on the public, and has been repeatedly reprinted in a complete edition of Virgil in English verse, of which the *Eclogues* and *Georgics* were contributed by Dr. Warton, with various critical dissertations by himself and others. Johnson's English Poets.

PITT, WILLIAM, earl of Chatham, one of the most illustrious statesmen that ever lived, was second son of Robert Pitt, and Harriet Villiers, sister to the earl of Grandison. He was born, by his own account, entered on the books of Oxford, in St. James' parish, on the 15th of November 1708. He received the early part of his education at Eton, as a scholar on the foundation, and at the age of eighteen he was entered of Trinity college, Oxford, as a gentleman-commoner. Of his academical reputation little is known, but a copy of Latin verses on the death of George I., published in the university tribute on that occasion, may be found in the *Anecdotes of his Life*, &c. in three vols. 8vo. to which we shall have frequent recourse in the present article. Before he left Eton, he was occasionally afflicted with an hereditary gout, which increased during his residence at Oxford, and which at length obliged him to quit the university without taking a degree. He afterwards made the tour of part of France and part of Italy, but his disorder was too deeply rooted in his constitution to be removed by foreign travel. He, however, constantly employed the leisure, which this painful and tedious malady afforded, in the cultivation and improvement of his mind.

He first came into parliament in the month of February 1735, for the borough of Old Sarum, and being a younger brother of a large family, his fortune was inconsiderable, and his friends obtained for him a cornet's commission in the Blues. The first time Mr. Pitt spoke in the house of commons, was to second the motion of his friend Mr. (afterwards lord) Lyttelton, for a congratulatory address to his majesty, on the marriage of Frederic, prince of Wales. His exertions on this occasion obtained for him the marked attention of the prince, who was then at the

head

head of the opposition party. With this party Mr. Pitt uniformly voted, by which he incurred the displeasure of sir Robert Walpole, who revenged himself by taking away his commission: which fact was celebrated by the following lines of his friend Lyttelton, ironically complimenting the minister for snatching the servile standard from his hand, and raising him to patriotic eminence.

“ Long had thy virtues marked thee out for fame  
Far, far superior to a Cornet’s name;  
This *gen’rous Walpole* saw, and griev’d to find  
So mean a post disgrace that noble mind:  
The servile standard from the free-born hand  
He took, and bad thee lead the patriot band.”

Mr. Pitt very soon attained the first place, for eloquence, in the ranks of opposition, and the minister soon repented his rashness in making him his enemy. This illustrious young man was distinguished for a fine figure, an expressive countenance, and a melodious voice. A keen eye, a graceful manner, and pleasing address, gave lustre and effect to a copious elocution, not, at first, highly correct, but animated with the fire of genius, and frequently marked with passages of singular force and energy that impressed themselves upon the memory, and were almost irresistible in their effect. “The records of the British senate,” it is said, “scarcely present another name so distinguished by that eloquence which bears away with it the passions and convictions of the hearer, and strikes an antagonist with awe. To these powers he added true elevation of mind, honour, integrity, and pure constitutional principles.” Without attempting to trace all the steps of this statesman’s progress from an oppositionist to a member of administration; we may briefly observe, that he continually rose in the esteem of the nation, as an able and vigilant opposer of all measures that appeared to him to be unconstitutional. Seven of his speeches preserved in Chandler’s Debates, and which were delivered during the remainder of sir Robert Walpole’s administration, exhibit the ardour of his mind, and the comprehensiveness of his views as a young but truly enlightened statesman; but his most important speech in this period of his life, was in support of a motion for inquiry into sir Robert Walpole’s (then earl of Orford) conduct. The motion was at first lost, but when introduced a second time, limiting the retrospect to the last ten years, it was carried; but by a ministerial manoeuvre the inquiry was defeated. To popular applause was added a more substantial testimony of approbation of his conduct, by Sarah, duchess of Marlborough, who, in a codicil to her will, dated in 1744, bequeathed him the sum of ten thousand pounds on the grounds of his public services. In 1745 Mr. Pitt was mentioned to the king, George II., by the duke of Newcastle, as a proper person to fill the office of secretary at war; but so obnoxious was his name to his majesty, probably on account of his constant opposition to Hanoverian politics, that he was decidedly, and at once, rejected, and a general resignation of the Pelham party followed. In the following year they were re-mitted, and Mr. Pitt was appointed to the office of vice-treasurer of Ireland. He soon after succeeded to the lucrative place of pay-master of the forces, which gave him an opportunity of shewing how disinterested he was with regard to pecuniary concerns. His predecessors had always held very large sums of the public money in their hands, of which they made advantage by means of the funds, but Mr. Pitt never once availed himself of his situation for his own private emolument. He even refused the usual perquisite upon a subsidy voted to the king of Sardinia, nor would he accept of any present in lieu of it. In 1754 Mr. Pitt

married Hester, daughter of Richard Grenville, a lady of great merit, of a highly cultivated mind, and of general and very extensive knowledge, with whom he passed the remainder of his life in uninterrupted harmony.

In 1755, when the king returned from Hanover, bringing subsidiary treaties with Hesse-Cassel, and Russia for its defence, he did not scruple to join Mr. Legge in opposing their ratification by parliament. On this account they were both dismissed, together with Messrs. George and Richard Grenville. It should be noticed, as exhibiting a prominent feature in Mr. Pitt’s character, that when turned out of his situation, the balances belonging to his office were all lodged in the bank. Those who encouraged the many attempts to throw a shade upon his moral character, were the discoverers of the fact, to their own utter mortification and confusion. Mr. Pitt was now an eager oppositionist, and spoke with honest indignation against the favourite measures of introducing foreign troops for the defence of the kingdom, and protecting Hanover by subsidies; the natural force of the nation, he said, was sufficient to repel any attack of the enemy. That state alone is worthy of being denominated a sovereign state, *qui suis stat viribus, non alieno pendet arbitrio*: which depends on its own strength, and not on foreign assistance. The disasters with which the new war began, occasioned great dissatisfaction with the conduct of public affairs, and the nation eagerly expected a change of men and measures; and in the autumn of 1756 a new administration was formed, in which Mr. Pitt took the place of secretary of state. The aspect of affairs was instantly changed; and the vigour infused into the public councils became immediately apparent by the formation of a national militia, to which the internal defence of the country was entrusted, while the foreign mercenaries were sent away:—by the levying of a body of Highlanders to serve in North America:—by the dispatching of squadrons of men of war to the East and West Indies, and by a successful expedition to Goree on the African coast. Mr. Pitt was still inimical to the war in Germany, at least under the conduct of the duke of Cumberland; on which account he and his friends were dismissed from office. The public discontent at this measure was manifested in the most marked and decisive manner, and his majesty invited him very soon after to take the efficient post in the ministry on any terms that were agreeable to him. He resumed his post of secretary, and arranged a ministry according to his own views of the necessity of the case, and it was that administration which raised the British nation from a state of depression and disgrace to the highest pitch of glory and success. Of this ministry he was the soul, and he infused his own spirit through every department of the state. The principle upon which he acted was, to disregard all party distinctions; all family interests; and to employ men of real talents wherever he found them. Instead of inactive and incapable commanders, whom he found in the service, he filled the army and navy with men raised to notice by their abilities and exertions. By a perpetual series of enterprizes he kept all the national powers on the alert, and assaulted the enemy in every quarter of the globe. He gave all his own time to business and none to parade, not holding a single levee during his secretaryship. He first accurately informed himself of the practicability of his plans, and then was most peremptory in his orders; and he provided, with the most wonderful foresight, against every emergency. The history of Mr. Pitt’s administration is so interwoven with the annals of the country, and the public events that occurred in it are so well known, that it will be sufficient if we give a mere summary of the most important; and previously to this we may shew the extent of his ministerial influence

fluence on his second promotion to the administration in 1757, of which we are now speaking. Mr. Pitt's first proposition, says the author of the Anecdotes, was the exclusion of lord Anson from the cabinet. The duke of Newcastle pleaded earnestly to have lord Hardwicke in the cabinet: he said it was the king's request. Mr. Pitt consented, on condition that sir Robert Henley had the great seal; this stipulation was desired by Leicester-house. Lord Temple was to be privy seal: himself secretary of state. The duke of Newcastle offered lord Temple the treasury: Mr. Pitt interposed, and said it could not be, his grace must go there himself; but if, at any time hereafter, he should think proper to retire, lord Temple should succeed him. Lord Anson was proposed for the admiralty; Mr. Pitt declared that lord Anson should never have the correspondence. The duke replied that such an alteration could not be made without his majesty's consent. Here the conference broke off. Mr. Pitt soon after had an audience with the king, when he laid before him the difference that had occurred between the duke of Newcastle and himself, concerning the admiralty. The king immediately consented that the correspondence with the naval officers, usually in the board of admiralty, should be given to Mr. Pitt, and that the board should sign the dispatches without being privy to their contents. It was at this audience Mr. Pitt said, "Sire, give me your confidence, and I will deserve it;" to which the king instantly replied "Deserve my confidence, and you shall have it;" and it is understood to have been a fact that Mr. Pitt at length so won upon the king, that he was able to turn his partialities in favour of Germany to the benefit of his country.

At the period we are speaking of, the duke of Cumberland had utterly failed in the attempt to rescue Hanover from the French, and had been obliged to make a disgraceful convention: this, for the moment, seemed to be a termination of the English interference in German affairs, but the king's predilections were not to be so defeated. He refused to ratify the convention, and was intent upon some opportunity for renewing military operations in that country, and to this, upon the victory of the king of Prussia over the French, the minister acceded, though on account of it he incurred much obloquy, and his popularity underwent a severe trial. The allied army was now to be commanded by Ferdinand, duke of Brunswick, a general of the highest reputation; the king of Prussia was to be enabled by a large subsidy to co-operate with all the effect to be expected from his extraordinary talents; and thus a diversion might be given to the French force, which would render the British arms superior in all other quarters. The event proved the justice of such expectations, and the minister seemed warranted in his emphatic sentence that America was conquered in Germany. The years 1758, 9, 60, and 61, were marked by a series of successes, interrupted almost solely by the failure of some expeditions to the coast of France; but these served to keep that country in a state of alarm, and retaliate upon it the fear of invasion which had so disgracefully depressed England at the beginning of the war. At the end of that period the navy of France was nearly annihilated, and it had scarcely a colony or settlement left in any part of the world. In the mean time, however, a change in the crown had taken place, the old king had died, and his present majesty, George III., had succeeded to the throne. The confidential, but secret advisers of the new sovereign, looked to new measures; they regarded with jealousy the vast ascendancy of the minister, then emphatically styled the *great commoner*, and his warlike spirit was considered as adverse to the re-establishment of peace, which now began to

be a national wish. A negotiation with France was commenced, which was rendered abortive by the intermixture of the concerns of Spain with those of this country. This intermixture was reſented in strong language by Mr. Pitt, who being, at that time, furnished with intelligence of the treaty of alliance between all the branches of the house of Bourbon, called the *family compact*, warmly urged in the cabinet an immediate commencement of hostilities against Spain. He was over-ruled, and he determined that he would be no longer responsible for measures which he could not guide. He resigned his post in October 1761, and was accompanied in his retreat by lord Temple. His past services were rewarded with a peerage conferred on his wife by the style and title of baroness of Chatham, and an annuity of 3000*l.* for his own life and her's. Mr. Pitt now returned to the condition of a private member of parliament with his fortune so little improved by the posts which he had held, that his principal support was his annuity. He took no leading part in the subsequent debates, but when the preliminaries of peace, in 1762, came to be discussed in parliament, he spoke in strong terms against many of the provisions of them. When the question of general warrants was moved, in 1764, Mr. Pitt spoke against their legality; and during all the contests between the prerogative of the crown and liberty of the subject, which agitated the early part of the present reign, he uniformly supported the popular cause. On account of his high character for patriotism, a considerable accession to his fortune was produced in 1765, on the death of sir William Pynsent, who bequeathed him an estate of 3000*l.* a-year. In 1766 the formation of a new ministry was committed to him, and on this occasion he took the office of privy-seal, and was himself raised to the peerage, with the title of the earl of Chatham. He was, in this instance, deserted by his early and intimate associate lord Temple, and the marquis of Rockingham; while other men of rank and talents refused to join him; disgusted, it was believed, by the tone of superiority and haughtiness which he was too much in the habit of assuming. His administration was therefore fluctuating and unsteady; his own influence gradually declined, and upon his resignation in 1768, he was so far fallen in public estimation, that he was scarcely missed by the public. The fire of his genius was not, however, extinct, and he was roused to exertions worthy of his former reputation. He took a leading part in all the great popular questions at that time discussed in and out of parliament. He began with a spirited attack in the house of lords upon the proceedings of the house of commons in the case of the Middlesex election. The doctrine of libels, as laid down by lord Mansfield, was another subject on which the earl of Chatham vigorously maintained the principles of liberty. But it was the quarrel with the American colonies, commencing 1773 or 4, that called forth the remaining powers of this venerable patriot. He opposed with all the powers of eloquence of which he was the master, though unfortunately in vain, every harsh and coercive measure which hastened the fatal catastrophe; he made motion after motion for closing the breach after it had been effected, and he foretold, with almost prophetic accuracy, the final result. Such was his anxiety on this subject, that it drove him from his bed in the midst of pain and great debility of body, and urged him to a vehemence beyond that of his best years, and at length was the immediate cause of his death. On the 7th of April 1778, the duke of Richmond having moved an address to his majesty, on the subject of the state of the nation, in which the *necessity of admitting the independence of America* was insinuated, lord Chatham deprecated in the warmest terms such a termination as the

the ruin of British greatness. "I rejoice," said his lordship, "that the grave has not closed upon me; that I am still alive to lift my voice against the dismemberment of this ancient and most noble monarchy. Pressed down, as I am, by the hand of infirmity, I am little able to assist my country in this most perilous conjuncture; but, my lords, while I have sense and memory I will never consent to deprive the royal offspring of the house of Brunswick of their fairest inheritance.—Shall this kingdom, that has survived, whole and entire, the Danish depredations, the Scottish inroads, and the Norman conquest; that has stood the threatened invasion of the Spanish armada, now fall prostrate before the house of Bourbon? Surely, my lords, this nation is no longer what it was! Shall a people that seventeen years ago was the terror of the world, now stoop so low as to tell its ancient and inveterate enemy, take all we have, only give us peace? It is impossible." Lord Chatham's plan, at this moment, for conciliation with America was, no doubt, inefficient; the colonists had passed the Rubicon, and in 1778 nothing short of independence would have satisfied them; but the dying earl thought otherwise, and he proposed to make a great impression upon France, to prevent her sending that assistance to the Americans, which he knew the French court had promised; he recommended also a treaty of union with the Americans; and that America should make peace and declare war in concert with Great Britain; that she should hoist the British flag, and use the king's name in her courts of justice; and he imagined that when America saw the impossibility of deriving any assistance from France, the congress would accept of these terms. He hoped thus at once to conquer and conciliate America by making a vigorous impression upon France. He saw that a war with France was unavoidable, and therefore with his usual penetration and ardour he wished instantly to strike the first blow; detesting that procrastination which gave the enemy power, not only of choosing the period of his convenience, but the first scenes of operation. The duke of Richmond having replied to his speech, lord Chatham attempted to rise to answer his grace, but after two or three unsuccessful efforts to stand, he fainted, and fell back in his seat. He was caught in the arms of some of the lords who stood close to him, and was conveyed to an adjoining room, and the house immediately adjourned. From this state of exhaustion he never recovered; he was indeed conveyed to his seat at Hayes in Kent, where he languished till the 11th of May 1778, when he died, in the 70th year of his age, to the sincere regret of every British subject, who had a just sense of human dignity and virtue. His death, rendered peculiarly impressive by the circumstances just referred to, excited general sympathy. Intelligence of his decease being sent to London, colonel Barré, the moment he heard of the fact, hastened to the house of commons, who were then sitting, and communicated the melancholy information. Although the event had been, in some measure, expected for several days, yet the house were affected with the deepest sensibility. Even the adherents of the court joined in the general sorrow, which was apparent in every countenance. The old members indulged a fond remembrance of the energy and melody of his voice; his commanding eye, his graceful action. The new members lamented that they should no more hear the precepts of his experience, nor feel the powers of his eloquence. A deep grief prevailed. The public loss was acknowledged on all sides. Every one bore testimony to the abilities and virtues of the deceased, and on this occasion all appearance of party was extinguished. His remains were honoured with a public funeral; his debts were paid by the nation, and an annuity of 4000*l.* out of the civil list was annexed to the earldom of Chatham. The

of the extraordinary merits of this great man was not confined to his own country; it pervaded the whole of Europe, and was attested by some of the highest characters in it. But of all the numerous portraits which have been drawn of him, and of which many are preserved in the "Anecdotes" already referred to, that of lord Chesterfield is the most striking, and probably, upon the whole, the most accurate. "His private life," says the noble writer, "was stained by no vice, nor sullied by any meanness. All his sentiments were liberal and elevated. His ruling passion was an unbounded ambition, which, when supported by great abilities, and crowned with great success, make, what the world calls, a great man. He was haughty, imperious, impatient of contradiction, and overbearing—qualities which too often accompany, but always clog, great ones. He had manners and address; but one might discern through them too great a consciousness of his own superior talents. He was a most agreeable and lively companion in social life, and had such a versatility of wit, that he would adapt it to all sorts of conversation. He had a most happy turn to poetry, but seldom indulged, and seldom avowed it. His eloquence was of every kind, and he excelled in the argumentative as well as in the declamatory way. But his invectives were terrible, and uttered with such energy of diction, and such dignity of action and countenance, that he intimidated those who were the most willing, and the best able to encounter him. Their arms fell out of their hands, and they struck under the ascendant which his genius gained over theirs." Demosthenes was his great model in speaking, and it has been said he translated some of his orations several times over. But though he was delighted with the manner of this orator, who united a wonderful power of expression to the most forcible method of reasoning, yet he was equally master of the pleasing, diffuse and passionate style of the Roman orator.

Of lord Chatham's literary productions, the chief is a volume of "Letters," written to his nephew, afterwards lord Camelford, father of the lord Camelford who was shot a few years since in a duel.

His lordship had five children, *viz.* three sons and two daughters: 1. John, the present earl of Chatham, born in 1756. 2. William, born in 1759, who will be the subject of the following article. 3. James Charles, born in 1761, and who is now dead. 4. Lady Hester, born in 1755, who married the present earl Stanhope, and died in the year 1780: this lady left three daughters, of whom the youngest, lady Lucy Rachel, married Thomas Taylor, esq. and who, to the great grief of all that knew her, died March 1, 1814, having exhibited through, alas! much too short a life, in almost the highest degree, every virtue that could adorn the child, the wife, the mother, and the friend. 5. Lady Harriet, born in 1758, who married the eldest son of lord Eliot, and died in 1786.

PITT, WILLIAM, second son of the preceding, and his successor in political talent and celebrity, was born May 28th, 1759. He was educated at home, under the eye of his father, who at a very early period discovered that in his son were talents that would repay all the attention that could be bestowed on them, and which were likely to raise him to distinction in the country. For the classical education of his son he had a domestic tutor, but he relied entirely upon his own instructions, communicated in conversation, for opening his mind, and giving him a turn to large and accurate enquiry. For the purpose of accustoming him to that facility of speaking, which he felt had been of great importance to his own rise in the world, he frequently made him declaim on given topics. At an age when, with the generality of young people, much remains to be learnt at school, Mr.

Pitt was found fully qualified for the university : and accordingly, as soon as he had completed his fourteenth year, he was entered at Pembroke-hall, Cambridge, and placed under the private tuition of Dr. Prettyman, the present bishop of Lincoln. At college he was distinguished alike for the closeness of his application, and for the success of his efforts, in attaining those branches of knowledge to which his studies were particularly directed. Although no proofs are recorded of extraordinary brilliancy in his academical career, yet few young men of any rank have passed through the probation of an university with a more respectable character for morals, abilities, industry, and regularity. He was intended by his father for the bar and the senate, and his education was regulated so as to embrace both these objects. Soon after he quitted the university, he went to the continent, and passed a short time at Rheims, the capital of Champagne. The death of his illustrious father, while he was in his 19th year, could not fail to cast a cloud over his prospects, but the foundation was laid of those qualities which would enable him to clear the path to eminence by his own exertions. He had already entered himself a student of Lincoln's Inn, and as soon as he was of age, in the year 1780, he was called to the bar, went the western circuit once, and appeared in a few causes as a junior counsel. His success during this short experiment was thought to be such as was amply sufficient to encourage him to pursue his legal career, and to render him almost certain of obtaining all the wealth and honours which await the able and industrious labourers in the vineyard of the law. He was, however, destined to pursue a very different path, to signalize himself as a statesman rather than as a barrister, and to take, for a long series of years, an active part in the regulation of the destinies of his country and the civilized world. At the general election in 1780, he was persuaded to offer himself as a candidate to represent the university of Cambridge, but, upon enquiry, he found his interest would not be equal to carry the election ; he therefore wisely declined the contest. Before, however, he had completed his twenty-second year, he was, through the influence of sir James Lowther, returned member of parliament for the borough of Appleby. This was in the month of January 1781, a period in which an opposition, composed of some of the greatest characters in the nation, was in warm contention against the ministry, which, under the guidance of lord North, was carrying on a disastrous war with the American colonies. By this party the power of the crown was regarded as too great for the balance of the constitution, and its reduction by means of certain reforms was the favourite topic of the times. For this purpose Mr. Burke, at the commencement of the session, brought forward his well-known bill for an economical reform in the civil list. It was on this occasion that Mr. Pitt, on the 26th of February, 1781, made his first speech in the British senate. The attention of the house was naturally fixed on the son of the illustrious Chatham, whose memory was still dear to the nation, but in a few moments the regards of the whole audience were directed to the youthful orator on his own account. Unembarrassed by the novelty of the situation in which he had been so lately placed, he delivered himself with an ease, a grace, a richness of expression, a soundness of judgment, a closeness of argument, and a classical accuracy of language, which not only answered, but exceeded, all the expectations which had been formed of him. During the same and the subsequent session, he occasionally rose to give his sentiments on the mal-administration of public affairs, and to prove that he inherited his father's abhorrence of the American war, as well as his liberal ideas on other public topics. What seemed particularly to interest his patriotic feeling, which he unquestionably possessed, at

this time, was a reform of parliament. The necessity of some improvement of this kind had strongly impressed a large proportion of the nation, and meetings of numerous bodies of men had been held in different parts, who had appointed delegates to consider of the best plans for bringing it to effect. In one of these conventions, holden at the Thatched-House tavern, Westminster, Mr. Pitt himself sat as a delegate. It is true that when examined on his oath, in the year 1794, on the trial of Mr. Tooke, he did not seem to remember that he sat as a delegate, though he admitted he had been engaged in attempts to obtain a parliamentary reform, for which, and which only, the prisoner, at the instance chiefly of Mr. Pitt, was then under trial for high treason ; but Mr. Sheridan, who was engaged with Mr. Pitt on the same business, expressly declared that the meeting at which they attended was a convention to which delegates were appointed from counties, towns, and different parts, to promote the object of parliamentary reform, and to act, not for themselves individually, but for those who deputed them.

As a public speaker, we have already observed Mr. Pitt had opened his course with great splendour, and it was soon evident to all who acted with him, or who were witnesses to the exercise of his talents, that he was apparently destined to act a high part on the political stage. When, however, lord North's administration broke up, and a new one was formed under the auspices of the marquis of Rockingham, Mr. Pitt was not invited to take a share in it. He still pursued the great object of parliamentary reform, and in May 1782, moved for a committee, "to enquire into the state of the representation in parliament, and to report to the house their observations thereon." The motion was lost by a majority of twenty. Mr. Pitt did not on this occasion endeavour to discuss the question as to the best species of reform ; he only asked for an enquiry, in order that a report might be made to the house as to the best means of carrying into execution a moderate and substantial reform in the representation of the people. On this and two other occasions, *viz.* in May 1783, and April 1785, he supported the necessity of a parliamentary reform with great eloquence, and the most powerful reasoning, after which he abandoned the cause for ever. It has since been ably advocated by alderman Sawbridge, Mr. Flood, Mr. Grey, sir Francis Burdett, and the Hon. Thomas Brand. (See a sketch of various proposals for a constitutional reform in the representation of the people from 1770 to 1812, supposed to be drawn up by Mr. Meadley, author of the lives of Dr. Paley and Algernon Sydney.) The death of the marquis of Rockingham soon put a period to the administration of which that nobleman was the bond of union, and in July 1782, lord Shelburne having, with a part of the former members, placed himself at the head of a new arrangement as first lord of the treasury, associated Mr. Pitt, who had just completed his 23d year, as chancellor of the exchequer : he refused, it was said, to occupy an inferior post. A general peace soon followed, which was made a ground of censure by a very powerful opposition ; and in April 1783, the famous coalition ministry took the places of those whom they had expelled. Mr. Pitt, during his continuance in office, had found little opportunity to distinguish himself, otherwise than as an able defender of the measures of administration, and a keen animadverter upon the principles and conduct of his antagonists. He retired with a character unimpeached, and immediately, as we have seen, resumed his efforts for promoting the reform of the representation.

A circumstance soon after occurred, which was the eventual cause not only of Mr. Pitt's return to office, but of his possession of a degree of authority with the king, and of popularity with the nation, which has rarely been the lot

of a minister, and which he preserved, with short interruptions, to the end of his life. A bill for the regulation of the territorial government in India was brought into parliament, in November 1783: the leading provision of which was to vest the whole management of the affairs of the East India Company in seven commissioners named in the act, and of course to be appointed by the existing ministry. It was most violently opposed by Mr. Pitt, on account of its being a violation of the chartered rights of the Company. It nevertheless passed the house of commons by a large majority, and was of course carried from thence to the upper house. In the mean time, an alarm was raised respecting the inordinate power which such a regulation would confer upon the ministry, and which would render them almost, or perhaps altogether, independent of the crown. It was afterwards ascertained, that, in a private audience granted to lord Temple by his majesty, this danger was represented in such a light, that directions were sent to all the noblemen dependent upon, or in confidence with, the court, to vote against the bill; and it was accordingly rejected. The immediate result of this was a change of ministry; and in the new arrangement, in December 1783, Mr. Pitt united in his own person the offices of first lord of the treasury and chancellor of the exchequer; and thus in his 24th year assumed the station of prime minister. Though called to this high station by the voice of the sovereign, he had a most formidable opposition to encounter in the house of commons; and his first India bill was rejected, on the motion for its commitment, by a majority of eight, there being for the motion 214, and against it 222. A spectacle was now presented, which in this country was regarded as very extraordinary, *viz.* that of a minister standing unmoved, though opposed to the majority of the national representatives; and it was obvious he had but one of two measures to adopt, either to retire from office, or dissolve the parliament. He chose the latter, which took place in the month of March 1784, and of course a general election succeeded. On this occasion, independently of that sort of influence, which, though nameless, is not less efficacious in obtaining a majority, it evidently appeared that the voice of the nation was decidedly in favour of the minister; and he had the singular good fortune of being supported as well by the friends of the royal prerogative, as by those of parliamentary independence, and the new parliament opened with a large majority on the ministerial side. Mr. Pitt, on this occasion, was returned member for the university of Cambridge; and his first measure of great importance in parliament was the passing of his India bill with some alterations: the essence of which was the constituting of a board of controul appointed by the king, out of the privy council, for superintending the civil and military government, the revenue, and concerns of the Company; while their commercial and internal affairs were left to the management of their own directors. The king was to nominate a commander-in-chief, and to possess a negative upon all appointments of the Company; and a new court of judicature was instituted for the trial of offences committed in India. Another important plan, in which he occupied himself, was for the prevention of smuggling; and for this purpose, he, by what was denominated the Commutation Act, took off the principal duties from tea, and supplied the deficiency by a large addition to the window-tax. Through the whole of his career, Mr. Pitt obtained the most general applause as a minister of finance; and the plans which he introduced for the gradual extinction of the national debt, are still operating with great benefit, and have enabled this country to carry on a twenty years' war of unexampled expence. Adopting the principle

of some able writers on political arithmetic, of the vast accumulating powers of compound interest, he introduced, in 1786, a bill, for setting apart a million annually for the purchase of stock, which sum was to be augmented by the interest of the stock so purchased. Perseverance in this plan, with occasional improvements, has already, amidst all the pressure of public burdens, extinguished between two and three hundred millions of debt, and produced a very considerable revenue to be applied to the same purpose. For this plan the financier was indebted to the late excellent Dr. Richard Price, who, on an application from Mr. Pitt, gave him three plans, of which he selected the least efficient; and for this he did not think it worth his while to make the smallest public acknowledgment. (See FUND and PRICE.) Mr. Pitt likewise made various alterations in the mode of collecting taxes, so as to obviate and prevent frauds and defalcations, render them more productive, and come in aid of the great system. A commercial treaty with France, in 1787, founded, as it was understood to be, on reciprocal advantages, and supported upon the liberal principle that neighbouring states, instead of being foes and rivals, might become mutual assistants in the progress to prosperity, exhibited, in a faint degree, the minister's attention to the trading interest. It was soon discovered, that the superior information of the English negotiators threw the benefits of the treaty so much into their own scale, that, upon experience of its effects, it occasioned general dissatisfaction among the merchants in France.

On the question of the impeachment of Mr. Hastings, Mr. Pitt, who seemed ever desirous of following public opinion, voted with the majority in favour of that measure, though most of his colleagues in office inclined to the other side. A similar attention to the prevailing sentiments, perhaps, induced him to act as the champion of the established church, in several applications from the dissenters for the repeal of the Test and Corporation Acts (see TEST); a measure to which it was supposed that a son of the illustrious earl of Chatham would have naturally been inclined. Mr. Pitt entered eagerly into continental politics, and the aggrandisement of Russia, under the empress Catharine, was considered by him as an object for the interference of the English court. He formed leagues to counterbalance her power in the north; and in order to prevent her from retaining possession of the fortrefs of Otchakof, he had nearly involved the two countries in a war. The unpopularity of this measure was soon manifest; his resolution was shaken, and he abandoned the object altogether. He next displayed a readiness to recur to arms, in a dispute with Spain respecting the fur-trade at Nootka sound, which was violently opposed in and out of parliament, and which was at length adjusted by a convention. His interference to preserve the power of the stadtholder in Holland, and defeat the machinations of the French in that country, was a very popular measure.

In the autumn of 1788, the people of England were thrown into a state of alarm, by a calamity which threatened to deprive them of their sovereign. In the beginning of October, his health appeared to be sensibly impaired; and though he was sufficiently recovered to hold a levee on the 24th of that month, before its conclusion the disorder assumed a marked character, and most serious aspect. Early in the ensuing month, it became generally known that it had settled in the brain, and had rendered his majesty incapable of exercising the royal functions. Parliament having been prorogued to the 20th of November, it became necessary that it should meet that day, as the sovereign, by whom only it could be further prorogued, was not in a situa-

ation to assert his prerogative. In the mean time, the leaders of the different parties, who were materially interested in the event, assembled in the capital; and an express was dispatched to Mr. Fox, then absent on the continent, to accelerate his return. This occurrence gave occasion to a display of the firmness and decision of Mr. Pitt's character. In this article we cannot enter into many particulars; but we may observe, that the first material question brought up by this event was, in whom the office of regent was vested? The prince of Wales being connected with the party in opposition, it was contended by them that the regency of course devolved upon him; while, on the other hand, Mr. Pitt supported the doctrine, that it lay in the two remaining branches of the legislature to fill up the office, as they should judge proper; admitting, at the same time, that no other person than the prince could be thought of for the post. By adopting this principle, he carried with him the concurrence as well of those who were attached to the popular part of the constitution, as of the king's friends, whose great object was to secure his return to power, on the cessation of his malady; and he was enabled to pass a bill, greatly restricting the power of the regent, which his majesty's timely recovery in the beginning of the year 1789 rendered abortive. Mr. Pitt was now left to pursue his plans of internal economy, without those interruptions to which he had lately been subjected. He had received, during the discussions on the regency, very decisive tokens of esteem from many of the most respectable public bodies in the kingdom; and he had the satisfaction of knowing, that the firm and steady conduct which he observed, on a question peculiarly calculated to try the firmness, steadiness, and consistency of a public character, had obtained for him, in a very marked manner, the confidence of their majesties, and greatly increased his popularity throughout the nation.

The next great event in which he was to take a leading part was the French revolution, an event the most momentous in its consequences that modern history records. (See REVOLUTION, *French*.) The influence of this vast convulsion could not be viewed by the politician, and the minister of a great empire, but in a double light, as exerted upon France itself, and upon the neighbouring states. Its principles and progress were, without doubt, watched with a jealous and anxious eye by Mr. Pitt, as well as by all others engaged in the service of existing governments. That the tyrannies of Europe, the despotism exercised in the greater and the smaller states, should tremble at the effects likely to be produced by the French revolution, was not a matter of surprise; but the constitution of our own country, if not actually founded, yet built upon the principles of national liberty, had at that moment nothing to dread: and it is not saying too much to affirm, that if the minister had possessed a mind capable of taking advantage of the circumstances as they rose, and kept aloof from war, he might have rendered the continental storms indefinitely useful, in promoting the prosperity of these islands. Had he led those systems of reform, which, but a few years before, he had been eager to propose, and strenuous to vindicate, he would have quieted the voice of discontent, and might have carried the country with him: instead of which, he now pertinaciously clung by those very abuses and corruptions, which he had formerly so successfully exposed, which gave room for invective, and at length excited those clamours, which subsequently required a "vigour beyond the law to suppress." There is scarcely any doubt that Mr. Pitt was, at first, against engaging in the war against France; but finding the majority of the cabinet determined on the project, he gave up his principles rather than retire from the helm of

government. If, however, he were tardy in entering upon hostilities, he made up in zeal for any moments that were lost in discussing the principles of action. The war of England, as well as that carrying on by the allied despots on the continent, was against *French principles*; and in the contest, the government of this country was soon aided by all the great powers and authorities of the nation; by the magistracy, the law, the church, the army, the mass of property hereditary and commercial. In opposition to this, the democratical party, if not very numerous, were actuated by an enthusiastic zeal bordering on madness. The views of the Whigs, headed by a Grey and an Erskine, extended only to such temperate reforms as had been proposed by the minister himself; but there were others, who were perpetually appealing to their country as to the necessity of those more radical changes, which had been vindicated by the duke of Richmond, now an adherent to Mr. Pitt and the court, *viz.* annual parliaments, and universal representation. Some few, but certainly very few in the whole realm, unless actuated by the hope of plunder, went much farther, and anticipated a revolution in this country similar to that in France.

Under such circumstances, a vigilant eye and a steady hand were obviously necessary to steer the vessel of state amidst those dangers. By his own zealous adherents, Mr. Pitt obtained for the time the epithet of "the pilot who weathered the storm;" but the manner in which he exercised the almost unlimited power entrusted to him, will not justify the application of this epithet. He had few of the qualities of a good pilot: he was more eager to engage in the battle, and to hurl the thunder of war, than to direct the motion of the vessel. To sound alarm as loudly as possible through the nation; to encourage the dissemination of high principles of government, and involve in common obloquy all measures of opposition, and all projects of reform; to augment, according to the apparent or pretended urgency of circumstances, the restrictions upon political liberty; and make sacrifices of the spirit of the constitution to what was denominated by the government party, the public safety; appears to have been the system of his domestic policy. For some time he probably had no participation in the plans for interfering in the internal concerns of France, which was the occasion of the first hostilities: for Mr. Pitt, in the year 1792, when laying before parliament a very flattering statement of the national revenue, did not hesitate to prognosticate a long continuance of peace and prosperity. Before, however, the year was closed, the militia was suddenly called out, parliament summoned at the shortest possible notice, and war was eventually declared by this country, by withdrawing our ambassador from the court of France. The deposition and execution of the unfortunate Lewis XVI., added to the circumstances just referred to, rendered the war in which Mr. Pitt engaged extremely popular throughout the nation. At that time, it was imagined the contest would be very short; that the democratic party of France would be destroyed; and either that the Bourbons would, in a few months, be restored, or that the empire itself would be divided among the neighbouring nations. The ill success which attended this confederacy could not certainly be charged upon the want of vigour in the British minister, who entered into it apparently with his whole heart, and lavished all the resources of the country upon its support. In a few months, the direful effects of war were felt over the whole of Europe. The calamities that attached themselves to our own commerce and manufactures, were great beyond example; but they were not peculiar to Britain. Bankruptcies spread over the whole continent of Europe, through

through France, Holland, Germany, Poland, Russia, Italy, and Spain; and almost every where, in the year 1793, private as well as public credit was impaired, if not, for the season, totally destroyed. In one respect England differed, at this crisis of general distress, from most of the other European nations: her public credit was sound, and, by affording a prompt and liberal assistance to her manufacturers and merchants, the difficulties were in a short time overcome. It was in the midst of these calamities, brought on by the prevalence and extension of the war system throughout Europe, that an able writer, and most excellent man, now, alas! no more, thus apostrophised the minister: "If I were bold enough to appreciate your political life, Mr. Pitt, I should be inclined to allow the outset of it extraordinary merit. The sentiment of approbation that attended you was indeed almost universal: you were the hope of the good, the pride of the wise, the idol of your country. If your official career had terminated with the discussions on the regency, it may be questioned whether modern Europe could have produced a politician or an orator more strenuous, more exalted, more authoritative; one whose ambition was apparently more free from selfishness; who afforded to his opponents less room for censure, or gave to his friends more frequent occasions of generous triumph, and honest applause. The errors that you have fallen into are natural for men long possessed of power uncontrolled; and in imputing them to you, I accuse you only of the weaknesses of human nature. It is natural, I believe, for successful ambition to seek new objects on which it may exert itself. Hence, after you had subdued opposition in England, you issued forth, like another Hercules, in quest of new adventures, and traversed the continent of Europe to seek monsters, whom you might subdue. You could not, however, but be sensible that the reputation of a minister of trade and finance, which you had justly obtained, was incompatible with that of a great war minister, in the present state of the nation. You took, therefore, the middle line: you made preparations for fighting on every occasion, but you took care not to strike. England might perhaps bear the expence of arming, but could not actually go to war; and this secret, which your three successive armaments discovered to all Europe, led Mirabeau on his death-bed to give you the name of *ministre preparatif*.

"In men long in possession of power, a secret sympathy, unknown perhaps to themselves, is gradually strengthening in favour of others in the same situation; and a secret prejudice, amounting perhaps at last to enmity, against opposition to power in every person. Hence the danger you saw to England, in the triumph of the patriots of Holland over the prince of Orange; and the safety we acquired from the subjugation of the Dutch by the Prussian arms. Hence also the perfect composure with which you expected the conquest of France, by the despots of Germany; and the sudden alarm with which you were seized, on the repulsion of that invasion, and the over-running of Flanders by the republican arms. By the freedom of Brabant, the constitution of England might be endangered; but it became more secure in your eye, it should seem, by the extension of despotism over every corner of Europe, and the success of foreign bayonets in rooting out liberty, as well as licentiousness in France." Such was the character of Mr. Pitt, drawn in 1793, by the masterly hand of the late Dr. Currie, under the feigned name of Jasper Wilson. Its likeness, after more than twenty years, will not be disputed; and on that account we have transferred it into our columns.

We do not pretend to enter into the details of the war with France, and shall content ourselves with noticing a few

of its consequences. Great Britain, on the whole, was triumphant on her own element; but the contest on the continent went entirely in favour of France, who, at length, united in a confederacy against England some of the powers who had been her allies in the commencement. She was now obliged to attend to her defence at home, and at the same time was pressed by an accumulation of difficulties, which native strength alone could have enabled her to surmount. In 1797, the bank of England was unable to answer the demands made upon it, and an act of parliament was passed to allow the governors of that establishment to suspend their payments in cash, and to substitute for gold and silver, notes of every description, even to those for two pounds and one pound. Another shock to the credit of the country was a daring mutiny of the fleet; and these disasters had scarcely been averted, before a most formidable rebellion in Ireland broke out, and which was not extinguished without the employment of a large military force, and the adoption of such sanguinary measures as were disgraceful to those who resorted to them. The public burthens went on accumulating in a vast ratio, and Mr. Pitt was obliged to have recourse to a triple assessment, and finally to an income tax, for raising the necessary supplies. In 1799, he, with the aid of pecuniary offers, produced a new confederacy, in which the numerous armies of Russia and Austria were employed to overthrow the preponderancy of France, but its final issue was completely unfortunate. In the following year Mr. Pitt had brought to effect the great and arduous measure of an union between Great Britain and Ireland, a measure, the true policy of which has long since been generally acknowledged. The war with France was now become so hopeless with regard to any object with which it might have commenced, and the nation was so completely wearied with protracted hostilities, that Mr. Pitt, aware that he could make no peace correspondent to his high language, resolved to quit the important station he had so long occupied. He resigned his post in February 1801, and was succeeded by Mr. Addington, now lord Sidmouth. The peace of Amiens soon followed, which Mr. Pitt defended in his place in parliament. He afterward, in some important points, joined the opposition, and the new minister was in a short time forced into a second French war. His talents were soon found unequal to the contest in which he had embarked, and Mr. Pitt, in 1804, resumed his post as first lord of the treasury, at the head of an arrangement formed of part of the ministers then in place, with the addition of some of his own friends. He now came into office as a war minister, and exerted all the vigour of his character to render the contest successful. He engaged the two great military powers of Russia and Austria in a new confederacy against France. The errors committed by them in their plan of co-operations were fatal to the cause, and the battle of Austerlitz put an end to the hopes of a check to the then enormous aggrandizement of an empire which seemed destined to sway the European continent. Mr. Pitt was in a state of health ill calculated to meet this terrible stroke. He had, from an early period of life, given indications of inheriting his father's gouty constitution, with his talents, and it had been thought necessary to make the liberal use of wine a part of his ordinary regimen. The habit and the necessity, of course, gained ground upon him, and he did not escape the charge of convivial intemperance. This abuse of strong stimulants, added to the cares and exertions of office during the stormy period of his administration, brought on a premature exhaustion of the vital powers. In December 1805, he was recommended to go to Bath, but the change afforded him no permanent relief. On

the 11th of January he returned to his seat at Putney, in so debilitated a state, as to require four days for the performance of the journey. The physicians, even yet, saw no danger, and they said there was no disease, but great weakness, in consequence of an attack of the gout. On the following Sunday he appeared better, and entered upon some points of public business with his colleagues in office: the subject was supposed to relate to the dissolution of the new confederacy, by the peace of Presburgh, which greatly agitated him. On the 17th, at a consultation of his physicians, it was agreed, that though it was not advisable he should attend to business for the next two months, yet there was hope he would be able to take a part in the house of commons in the course of the winter. On the 20th, however, he grew much worse, and it was admitted his situation was precarious; in other words, those who till then had encouraged hope in the patient, now saw that he was in the most imminent danger, and that, probably, he had not many hours to live. The bishop of Lincoln, who never left him during his illness, informed him of the opinion now entertained by sir Walter Farquhar, and requested to administer to him the consolations of religion. Mr. Pitt asked sir Walter, who stood near his bed, "How long do you think I have to live?" The physician answered that he could not say, at the same time he expressed a faint hope of his recovery. A half smile on the patient's countenance shewed that he placed this language to its true account. In answer to the bishop's request to pray with him, Mr. Pitt replied, "I fear I have, like too many other men, neglected prayer too much, to have any ground for hope that it can be efficacious on a death-bed—but," making an effort to rise as he spoke, "I throw myself entirely on the mercy of God." The bishop then read the prayers, and Mr. Pitt appeared to join in them with a calm and humble piety. He desired that the arrangement of his papers and the settlement of his affairs might be left to his brother and the bishop of Lincoln. Adverting to his nieces, the daughters of earl Stanhope by his elder sister, for whom he had manifested the sincerest affection, he said, "I could wish a thousand or fifteen hundred a-year to be given them; if the public should think my long services deserving of it." He expressed also much anxiety respecting major Stanhope, that youthful hero, who fell a sacrifice to his valour at Corunna, in company with his friend and patron general sir John Moore, and his brother, who was also at Corunna at the same time, and who has been engaged in all the great battles in the peninsula, and more than once severely wounded in his country's service. Mr. Pitt died about four o'clock in the morning of the 23d of January 1806, in the 47th year of his age. A public funeral was decreed to his honour by parliament, and 40,000*l.* to pay those debts which he had incurred in his country's service. Public monuments have been since erected to his memory in Westminster-Abbey, in the Guildhall of the city of London, and by many public bodies in different parts of the kingdom. There is no doubt that he died in possession of the esteem and attachment of a large portion of his countrymen, and his political consequence was proved by the entire dissolution, at his death, of the ministry of which he was the head, and the necessary admission of a party, against whom strong prejudices were known to prevail. He will long live in memory as a distinguished orator, an able financier, and a man of uncommon talents: whether he is also to be ranked among great and enlightened statesmen, impartial history will hereafter decide. Dr. Stock, in his interesting life of Dr. Beddoes, speaking of the "Essays

on the public Services of Mr. Pitt," says, "But we are as yet too near the time of action to examine, with equal impartiality, the merits of writings so hostile to Mr. Pitt. A great portion, however, of the events anticipated in these essays, is already become history. The career of this celebrated statesman is closed. If his measures were good, he can no longer direct; if bad, he can no longer restrain their influence. A long period must elapse, perhaps it must be left to distant posterity, to trace their full influence on the destinies of Great Britain. The censure which the author (Dr. Beddoes), has thrown upon his plans may be unjust, but his anticipation of their failure was prophetic. Principles were in action, the full operation of which had not been familiar to human experience. Common political calculations, and common-place statesmen, were every where baffled and confounded. But however deplorably his schemes of foreign policy may have failed, whether from deficiency in political sagacity, or from incapacity or treachery of allies; his advocates will triumphantly maintain that, in point of primary importance, he succeeded: he saved the English constitution. If this be true, no praise can exceed his deserts, and no honours that a grateful nation can pay to his memory can be excessive. To have preserved a constitution, which has raised man to the true level of his nature, which has ripened souls, which secures to every individual under its protection a degree of practical liberty of writing, of speaking, and of action, greater than exists in any country on the surface of the globe, must emblazon his name to all posterity. Should all the other pillars that support the temple of his fame give way, so long as this remained unshaken, it would, singly, uphold the fabric. His opponents will, however, remind us of unhallowed attempts to deprive us of these proud distinctions; and they will contend, that great as are the honours that should be paid to his memory, if the measures of his administration should appear to have been really the means of preserving this glorious monument of the wisdom of our ancestors; so great must be the indignation that should pursue it, if they should have proved to have impaired its magnificence, to have undermined its foundations, and to have exposed us to the hazard of a contest, in which not common interests only are involved, but on the issue of which is staked every thing that is dear to the heart of a Briton, every thing that can render life itself valuable and desirable."

It is not easy to understand what is meant by the word Constitution: if by it is intended simply the government by King, Lords, and Commons, Mr. Pitt found such a government, and left it as safe as he found it; but it would be difficult to prove that it ever was in danger: in the very worst period,—in the years 1793 and 4,—it may be doubted, if in the whole extent of Great Britain, there could have been found a thousand persons, who would, whatever were their motives, have wished for any change in this respect; and hence no great merit can be given to Mr. Pitt as the favourer of our mixed form of government. If, however, by the Constitution are intended those guards and that security of the people, which are essential to their existence as a free nation, it would not be easy to shew in what respect Mr. Pitt was the favourer of the Constitution. The securities to which we have referred, and which, in the estimation of Blackstone and all our great constitutional lawyers, have been regarded as the fundamentals of our excellent constitution, are *Magna Charta*, the *Habeas Corpus Act*, the *Liberty of the Press*, and *Trial by Jury*. If these exist in a country, the people have a pure and a perfect constitution; they need no more to render them, in every just sense of

the word, a free people. *Magna Charta* declares, that no man shall be imprisoned contrary to law: during Mr. Pitt's administration, many persons were thrown into dungeons, in defiance of this wholesome provision of our ancestors. The *Habeas Corpus Act* affords an additional security from false and unjust imprisonment, and points out effectual means, for a person thus maltreated, as well to release himself, though committed by the king in council, as to punish all those who shall thus unconstitutionally misuse their power. Mr. Pitt not only suspended the operation of the *Habeas Corpus Act* more frequently than any former minister, and that often without a show of reason, but at length bargained with his successor for an act of indemnity for all his unconstitutional acts, so that the persons thus injured in their fortune, their health, and fair fame, were prevented from seeking pecuniary redress by the law of the land. (See Woodfall's *Parl. Deb.* 1801. vol. ii.) The liberty of the press had not for a century and more been under such shackles as it was during the administration of Mr. Pitt, and by certain bills brought into parliament, and passed into laws by his influence and that of lord Grenville, the tongue was fettered, and the Bill of Rights made nugatory. In one of Mr. Pitt's treason bills, he endeavoured to contract those advantages which the statute of Edward III. allows to the accused, by granting them less time than ten days to enquire into the characters of those who were to try, and those who were to be brought as witnesses against them. When, however, he found the House determined to resist the innovation, he triumphantly said, that "Nothing was more easy than utterly to defeat that wise and humane law, by sending to the men accused a *cloud of witnesses*," to perplex and confound them. In 1794, what he had said *might* be done, *was* done, and he was still prime minister. On the memorable state trials, each prisoner had more than 200 persons nominated as jurymen to try him, and the names of 213 persons were given him, as those who might be produced as witnesses in the cause. Hence the *trial by jury* was invaded in one of the most important cases that ever arrested the public attention. This, however, was but a sequel to his general conduct; he had extended the Excise and Custom-house laws beyond all former precedent; and in many of his fiscal regulations, he utterly discarded the idea of the intervention of a jury between the king and the subject. In a hundred of his acts, the magistrate is also made paramount to all law, and it requires but the evidence of a common thief-taker to deprive a subject of his liberty. Cases of this kind are not rare; scarcely a month or even a week occurs, but the public papers announce, that persons are committed to prison for three or six months by the order of a police magistrate, who is guided in his decision only by the oath of a man, perhaps much worse than he who is subjected to the punishment.

We may, indeed, proceed one step farther, and say, that notwithstanding the early tincture which Mr. Pitt's mind may be supposed to have received in favour of freedom and those principles, which we have assumed, on good authority, as the bulwarks of the British constitution, and the voluminous additions which he made to our acts of parliament, it will be difficult to find a single disinterested law introduced by him in favour of the liberty of the subject, within the whole compass of our statute books. This fact, if it be a fact, must not be imputed to the spirit of the times; in the early periods of the present reign, toleration and religious liberty received some important accessions; and since the death of Mr. Pitt, she has, under the auspices of the present administration, been still better treated, and

a wider scope has been given to speculative enquiry. That all improvement in civil and religious liberty should have ceased during the twenty years of Mr. Pitt's ministry, cannot be accounted for if he had been, in office, what he unquestionably was when he first entered upon public life, an ardent friend to the liberties of his country. We should gladly give, if authorities would support us, some traits of a different kind to justify the epithet of his friends applied to him as the saviour of the constitution. With this view, we have looked through the voluminous History of Mr. Pitt's Political Life by Mr. Gifford; but in all the six volumes nothing cheering, nothing favourable appears. As a private character, he was, we believe, every thing that was excellent and amiable; to this, and to his character as a man of real talent, we shall turn, and with that estimate shall conclude our article.

Mr. Pitt possessed no particular advantages of person or physiognomy, the first of which was ungraceful, the second repulsive rather than attractive. As a speaker he was thought to be without a rival: such was the happy choice of his words, the judicious arrangement of his subject, and the fascinating effect of a perennial eloquence, that his wonderful powers were acknowledged even by those who happened to be prepossessed against his arguments. When employed in a good cause he was irresistible; and in a bad one he could dazzle the judgment, lead the imagination captive, and seduce the heart, even while the mind remained firm and unconvinced. Ambition and the love of power were his ruling passions; his mind was elevated above the meaness of avarice. His personal integrity was unimpeached, and so far was he from making use of his opportunities to acquire wealth, that he died involved in debts, which negligence, and the demands of his public station, rather than extravagance, had obliged him to contract; for his tastes were simple, and he does not appear to have had a fondness for splendour or parade. His private character has been drawn by a friend, and it corresponds perfectly with other accounts that we have had from those much in his confidence, and who were frequently in his company at times, when the man and not the minister was displayed in all its native colours: "With a manner somewhat reserved and distant in what might be termed his public department, no man was ever better qualified to gain, or more successful in fixing, the attachment of his friends, than Mr. Pitt. They saw all the powerful energies of his character softened into the most perfect complacency and sweetness of disposition in the circles of private life, the pleasures of which no one more cheerfully enjoyed, or more agreeably promoted, when the paramount duties he conceived himself to owe the public, admitted of his mixing in them. That indignant severity with which he met and subdued what he considered unfounded opposition; that keenness of sarcasm with which he expelled and withered, as it might be said, the powers of most of his assailants in debate, were exchanged in the society of his intimate friends for a kindness of heart, a gentleness of demeanour, and a playfulness of good humour, which no one ever witnessed without interest, or participated without delight." See Rose's Examination into the Increase of the Revenue, &c. during the Administration of the Right Hon. William Pitt. See also *Monthly Mag.* vol. xxi. *Wyvill's Political Papers.* *Stock's Life of Dr. Beddoes.* *General Biog.* *New Ann. Regist.* and *Parliamentary Debates.*

PITT, in *Geography*, a county of America, in North Carolina, containing 9169 inhabitants.—Also, a township of Allegany county, Pennsylvania, containing 2441 inhabitants.

**PITT Island**, an island in the North Pacific ocean, near the W. coast of North America, between Norfolk sound and Salisbury sound, about 50 miles long and 13 broad. N. lat.  $57^{\circ} 20'$ .—Also, a small island in the Chinese sea. N. lat.  $10^{\circ} 57'$ . E. long.  $114^{\circ} 36'$ .

**PITT's Archipelago**, a range of islands in the North Pacific ocean, extending along the west coast of North America, about 60 miles in length; so called by captain Vancouver in honour of the Rt. Hon. William Pitt. N. lat.  $54^{\circ} 10'$ . W. long.  $52^{\circ} 15'$ .

**PITTACIUM**, *Pittacus*, in *Surgery*, a name which some authors give to a piece of cloth spread with a salve, to be laid on a part affected.

**PITTACUS**, in *Biography*, a warrior and philosopher, reckoned among the seven sages of Greece, was born at Mitylene, in Lesbos, about the year 650 B.C. In a war between his countrymen and the Athenians, he challenged to combat their general Phrymon, a man of great strength, who had been a victor in the Olympic games, and vanquished him by means of a concealed net, which he threw over the enemy's head. As a reward for his valour he was offered a very large tract of land, which he had recovered from the enemy, but he would accept no more than he could measure by a single cast of the javelin, and of this even he consecrated half to Apollo. He afterwards expelled the tyrant Melanchrus from Mitylene; and having liberated his country, was placed by his fellow citizens at its head. He now governed with as much wisdom as he had fought with bravery. He enacted many useful laws, and in order that they might be the better remembered he comprehended them in 600 verses. In one of these he gave a severe check to the propensity of the people to drunkenness, by enjoining a double punishment for crimes committed in that state. After having held the reins of government during ten years with high reputation, he resigned his authority, and spent the remainder of his life in study and retirement. He died about the year 570 B.C. The maxims of Pittacus were held in such high esteem, that many of them were inscribed upon the walls of the temple of Delphi. The following may be given as specimens of them: "Power discovers the man;" "Whatever you do, do it well;" "Be watchful for opportunities." Enfield's Hist. Phil.

**PITTANCE**, from *pitantia*, a small coin of Poictou, see Du Cange; a small portion of food, or *entremet*, in opposition to *generale*, or a solid dish, the mention of which pittance frequently occurs in the constitutions of our ancient communities, where they determine how many *generalia* and how many *pitantia* shall be served up on such and such days. These pittances, from whence our present word pittance is derived, usually consisted of plates of legumes, cheese, or fruit.

**PITTARO**, in *Geography*, a mountain of Calabria Ultra; 14 miles N.W. of Bova.

**PITTEN**, a town of Austria; 8 miles S. of Ebenfurth.

**PITTENWEEM**, a royal borough and sea-port town, is situated in the district of St. Andrew's, and the south-east coast of the county of Fife, Scotland. It was formerly a place of considerable trade, but there is now few shipping here. The coal and salt-works, however, still occasion some little activity here and in the adjacent villages. Pittenweem was first constituted a royal borough by king James V. in 1547; and now enjoys the privilege, in conjunction with Crail, of sending one member to the imperial parliament. In the rebellion in the seventeenth century this town suffered greatly, upwards of thirteen sail of vessels belonging to the port having been destroyed or taken by the enemy in the course of two or three years. Here are

some remains of an ancient priory for canons regular of the order of St. Augustine, which was dedicated to the Virgin Mary, and was a cell to the mitred abbey of St. Andrew's. This priory had large landed possessions, together with the churches of Rhind, Anstruther Wester, &c., which are now erected into a regality called the regality of Pittenweem, under the jurisdiction of lairds of Anstruther as heritable bailies. About half-way between the ruins and the beach is a great cave, or weem, whence the borough derives its name. It consists of two spacious apartments, at the junction of which is a stair leading to a subterraneous passage, which formerly communicated with the monastery, but which has long been blocked up by the earth falling in. There is also another stair still remaining, which leads from the refectory to the further extremity of this passage.

Pittenweem, with respect to church government, is in the presbytery of St. Andrew's and synod of Fife. It is distant about  $33\frac{1}{2}$  miles N.E. by N. from Edinburgh; and according to the parliamentary returns of 1811, contains 194 houses and 1096 inhabitants. The late learned John Douglas, D.D., lord bishop of Salisbury, was a native of this town. His lordship is well known in the literary world as the vindicator of Milton, from the charge of plagiarism brought against him by Lauder. He was one of the trustees of the British Museum, and co-vice-president of the Society of Antiquaries in London. Carlisle's Topographical Dictionary of Wales, vol. ii. 4to. Beauties of Scotland, vol. iv.

**PITTERSBERG**, a town of the duchy of Carinthia; 3 miles N. of Mautern.

**PITTI**, a small island in the straits of Malacca, N. lat.  $2^{\circ}$ . E. long.  $101^{\circ} 29'$ .

**PITTONIA**, in *Botany*, so named by Plumier, in honour of his great countryman and contemporary, Joseph Pitton de Tournefort. (See *TOURNEFORTIA*.) Linnaeus, according to the rule he had laid down, preferred the latter appellation, as derived from the name by which the person commemorated was universally known, out of his own country; and the example has been followed by all following writers, even in France; at least in this instance. In some cases there has been a contrariety of opinion. (See *LOUICHEA* and *FONTANESIA*.) Such difficulties are for the future removed, by the simplification of French surnames, since the revolution.

**PITTOSPORUM**, so named by sir Joseph Banks, according to Gærtner. The word is derived from *πιττωω*, to besmear with pitch, and *σπυρον*, seed or offspring; because the seeds are enveloped in a pitchy fluid, exuding internally from the capsule as it ripens; a circumstance altogether peculiar, thus happily expressed in the generic name.—Gærtner. v. 1. 286. t. 59. Schreb. 150. Willd. Sp. Pl. v. 1. 1145. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 2. 27. Lamarck Dict. v. 5. 361. Illustr. t. 143.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Dumosa*, Linn. *Rhamnii*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five, generally very deep, acute, equal segments, deciduous. *Cor.* Petals five, inserted into the receptacle, alternate with the segments of the calyx, oblong, equal; their claws longer than the calyx, linear, channelled, erect, converging in the form of a tube; border ovate-oblong, spreading, recurved. *Stam.* Filaments five, inserted into the receptacle, alternate with the petals, the length of the claws, linear, compressed; anthers incumbent, arrow-shaped, simple. *Pist.* Germen superior, roundish; style awl-shaped, the length of the stamens; stigma obtuse. *Peric.* Capsule roundish, angular, pointed, of from two to five cells and as many

many valves, the partitions from the middle of each valve. *Seeds* three or four in each cell, angular, inserted into the inner edges of the partitions, enveloped in a resinous fluid produced by the inside of the valves.

Eff. Ch. Calyx five-cleft, deciduous. Petals five, converging into a tube. Capsule of several cells and as many valves. Seeds enveloped in a liquid resin.

1. *P. coriaceum*. Thick-leaved Pitch-feed. Ait. n. 1. Willd. n. 1. Vahl Symb. v. 2. 43. Andr. Repof. t. 151. —Leaves obovate, obtuse, coriaceous, very smooth. Capsules of two valves.—Native of Madeira. A greenhouse shrub, flowering in May, said to have been first raised by Messrs. Lee and Kennedy, about the year 1783. The *stem* is six or eight feet high, bushy, with round, finely downy, *branches*, leafy at their summits. *Leaves* crowded, alternate, two or three inches long, remarkably coriaceous, of a fine green, smooth and even, not shining, with one rib, and numerous scarcely visible transverse veins. *Footstalks* short, broad, channelled, downy when young. *Stipulas* large, broad, solitary, within side of the footstalks. *Flowers* several, in terminal bracteated umbels, with downy stalks, white, powerfully fragrant, like Jasmine, but of short duration. *Calyx* divided to the very base, and finally falling off in separate portions. *Petals* obovate, obtuse, recurved, scarcely revolute. *Germen* elliptic-oblong. *Capsule* said to have only two valves, a point we have had no means of determining.

2. *P. Tobira*. Glossy-leaved Pitch-feed. Ait. n. 2. Sims in Curt. Mag. t. 1396. (Euonymus Tobira; Thumb. Jap. 99. Willd. Sp. Pl. v. 1. 1130. Tobira; Kämpf. Am. Exot. 796. t. 797.)—Leaves obovate, obtuse, coriaceous, very smooth and shining. Capsules of three valves.—Native of Japan. Brought by an India ship from China to Kew, in 1804, where it flowers abundantly in summer, being a hardy greenhouse shrub. This is so like the foregoing, that it is not easy to discern a specific difference between them. The *leaves* of the *Tobira* however are of a more shining and darker green above; pale beneath. *Capsule*, on a specimen from Kew, triangular, and of course having three valves. *Flower-stalks* and *germen* very hairy, as in the *coriaceum*, though none of the figures of either give the least indication of such a circumstance. Kämpfer's plate shews the *inflorescence* to be somewhat racemose.

3. *P. revolutum*. Downy-leaved Pitch-feed. Ait. n. 3. —“Leaves elliptical, bluntish; downy beneath; revolute at the margin.”—Native of New South Wales. Sent by Sir Joseph Banks to Kew, in 1795. It flowers from March to August, and is a greenhouse shrub, like the two above described. We have two specimens from Port Jackson, answering to the character we have copied, except that the *leaves* are acute, and indeed pointed, in both. The *flowers* in one grow five or six together, in a stalked hairy *umbel*; in the other they stand in pairs, on very short *stalks*, which at length become thick and woody, supporting a large woody *capsule*, of three reflexed valves, whose partitions are but slightly prominent. These specimens appear to constitute different species, and probably will be better explained in the sequel of Mr. Brown's Prodromus.

4. *P. ferrugineum*. Rusty Pitch-feed. Ait. n. 4. (Cortex filarius; Rumph. Amboin. v. 7. 13. t. 7.—Leaves elliptical, taper-pointed, smooth. Footstalks clothed with rusty down. Calyx equally divided to the base.—We received specimens of this, in March 1789, from Mr. Hoy at Sion-house. It is said in Hort. Kew. to be a native of Guinea, and to have been introduced before 1787, by the earl of Tankerville, flowering in the stove from February to May.

We are possessed of fine specimens of this very plant, gathered by the late Mr. Christopher Smith in Oma, one of the Molucca isles, near Amboyna, but without any mention of its name or properties. Cortex filarius of Rumphius appears to be the same thing. The author never saw the *flowers*, but his representation and description of the bivalve *fruit* exactly answers to the genus before us. He speaks of the bark as affording a sort of thread. Of this indeed we can observe no signs, in our dried specimens, but every other part of his description agrees exactly. The *stem* is shrubby, rather slender, determinately branched; young *branches* round, clothed with rusty down, leafy towards the ends. *Leaves* scattered or crowded, elliptic-lanceolate, pointed at each end, two or three inches long, entire, slightly wavy, with one rib and several transverse veins ending in minute reticulations; smooth on both sides, except an occasional pubescence on the ribs; paler and more opaque beneath. *Footstalks* three-quarters of an inch long, slender, channelled, clothed with fine, shining, rusty down. *Flowers* very numerous, small, white, in long-stalked, aggregate, rusty, downy *umbels*. *Calyx* almost smooth, in five deep, awl-pointed, recurved segments, not so speedily deciduous as in some other species. *Petals* folded spirally over each other in the bud; recurved when expanded. *Antbers* obtuse. *Germen* very hairy. *Style* short. *Stigma* capitate. We have seen nothing of the *fruit*, or even the enlarged *germen*.

5. *P. undulatum*. Wave-leaved Pitch-feed. Ait. n. 5. Venten. Jard. de Cels, t. 76. Andr. Repof. t. 383.—Leaves elliptical, pointed, smooth; waved at the margin. Footstalks nearly smooth. Calyx five-toothed, split on one side to the base.—Native of New South Wales. Communicated to Kew garden, in 1789, by Sir J. Banks. A greenhouse shrub, flowering from April to June. Its habit is very much like the last, but every part is larger. The *leaves* are more wavy; their adult *footstalks* smooth, though downy when young. *Flowers* white, fragrant, full twice as large as those of *P. ferrugineum*, but much fewer, in solitary, nearly simple, sessile *umbels*, whose stalks are nearly smooth. *Calyx* essentially different, being divided only one-third of its length into five acute segments, though split down to the base at one side, sometimes in two places; one tooth, in the latter case, being entirely separate to the bottom. The whole *calyx* soon falls off. Its inside and edges are a little downy. Ventenat's account of the *inflorescence* differs from our's, but we find some parts of our specimens have, as he says, three-flowered stalks. He errs in giving the Canary islands as the native country of this species, confounding its history with that of the *coriaceum*. What Gærtner has described, under the names of *tenuifolium* and *umbellatum*, are probably distinct from all the above, or he would have been cited in Hort. Kew. As he gives no specific characters, we can form no just idea of these species. Possibly his *tenuifolium* may be our *undulatum*. Here again we must recur to Mr. Brown's future communications, in the long-expected continuation of his work.

PITTOQUOTTING, in *Geography*, an Indian settlement in the state of Ohio, at the mouth of Huron river, which discharges itself into lake Erie.

PITTSBOROUGH, or PITTSBURG, a town of America, the capital of Chatham county, North Carolina, situated on an eminence, and containing a court-house, a gaol, and about 40 or 50 houses. The adjacent country is fertile and well cultivated; and is much resorted to from the maritime parts of the state in the sickly months. The Hickory mountain is not far distant, and both the air and water are here

here as pure as any in the world; 26 miles S.W. of Hillsborough.

**PITTSBURG**, a post-town of Pennsylvania, the capital of Allegany county, situated on a beautiful plain terminating in a point, between the Allegany and Monongahela rivers; and about a quarter of a mile above their confluence, by which they form the Ohio. This town was laid out on Penn's plan in the year 1765. It contains between 200 and 300 houses, 4768 inhabitants, a gaol, court-house, Presbyterian church, a church for German Lutherans, an academy, a brewery, and a distillery. It has been lately fortified, and a party of troops has been stationed in it. The hills on the Monongahela side are very high, extend down the Ohio, and abound with coals. Before the revolution one of these coal hills took fire and continued burning for eight years; when it was effectually extinguished by part of the hill giving way and filling up the cavity. The situation, in the midst of hills covered with trees, is delightful. At the distance of 100 miles up the Allegany is a small creek, which in some places boils or bubbles forth, like the waters of the Hell Gate in the state of New York, from which proceeds an oily substance, deemed by the people of the country an infallible cure for weakness in the stomach, rheumatic pains, sore breasts in women, bruises, &c. The oil is collected and brought to Pittsburg for sale. The navigation of the Ohio, in a dry season, is rather troublesome from Pittsburg to the Meege town, about 15 miles; but from thence to the Mississippi there is always water sufficient for barges carrying from 100 to 200 tons burden; 393 miles W. by N. from Philadelphia. This town is a thoroughfare for the incredible number of travellers from the eastern and middle states to the settlements on the Ohio; and is very rapidly increasing. At or near this place ship-building is an object of great attention. It was formerly in the hands of the French, and then called Fort du Quebec, afterwards fort Pitt, in honour of the late lord Chatham. General Braddock, advancing at the head of British troops to take it in 1756, fell in an ambuscade and was killed; 4 miles from Pittsburg. N. lat.  $48^{\circ} 31' 44''$ . W. long  $80^{\circ} 8'$ .—Also, a township of America, in Frontiac county, Upper Canada, adjoining to Kingston, and here opening westward to lake Ontario.

**PITTSFIELD**, a pleasant post-town of Massachusetts, in Berkshire; 6 miles N. of Lenox. This township, and also those N. and S. of it, are situated in a rich vale from one to seven miles wide, on the banks of Housatonic river. It was incorporated in 1761, and contains 2665 inhabitants.—Also, a township of Rockingham county, New Hampshire, incorporated in 1782, and containing 1050 inhabitants.—Also, the north-easternmost township of Rutland county, Vermont, containing 338 inhabitants.—Also, a town in Otsego county, New York; 12 miles W.S.W. of Cooperstown.

**PITTSFORD**, a town of America, in Rutland county, Vermont, containing 1936 inhabitants.

**PITTSGROVE**, a town of America, in the county of Salem, New Jersey, containing 1991 inhabitants.

**PITTSSTON**, a town of America, in the county of Kennebec, and district of Maine, containing 1018 inhabitants.

**PITTSSTOWN**, a post-town of Hunterdon county, New Jersey; 58 miles N.N.E. of Philadelphia.—Also, a township of Rensselaer county, New York.—Also, a post-town in Luzerne county, Pennsylvania.

**PITTSYLVANIA**, a county of Virginia, containing, in 1810, 17,172 inhabitants. At the court house is a post-office, 300 miles from Washington.

**PITTY**, the most westerly of the mouths of the river

Indus, which separates it from the Darroway, 50 miles below Tatta, and runs into the sea, N. lat.  $24^{\circ} 42'$ . E. long.  $66^{\circ} 22'$ .

**PITUINA**, in the *Materia Medica*, a name for the resin of the pitch-tree.

**PITUITA**, in *Medicine*, is the same with the Latin writers, as the *phlegma* of the Greeks. See **PILLEGM**.

**PITUITARY GLAND**, in *Anatomy*, called also hypophysis; a small body lodged in the sella Turcica of the sphenoid bone, and connected to the basis of the brain. See **BRAIN**.

**PITUITARY Membrane**, is the lining of the nasal cavities. See **NOSE**.

**PITUITARY Sinuses**, are the hollows in the body of the sphenoid bone communicating with the nose. See **CRAanium**.

**PITUM HOTUN**, in *Geography*, a town of Chinese Tartary; 438 miles E. of Peking. N. lat.  $40^{\circ} 18'$ . E. long.  $125^{\circ} 21'$ .

**PITUMBA**, in *Botany, a word that occurs in Schreber's index, and, by his reference, seems synonymous with his *Wolfa*, under which however it is not mentioned. Those who are fortunate enough to meet with it in any book, may perhaps by that means discover what *Wolfa* is, of which we profess ourselves ignorant.*

**PITY**, in *Ethics*. See **COMPASSION**.

**PITYCIA**, in *Ancient Geography*, an island of the Adriatic sea, on the coast of Liburnia.

**PITYDES**, a name used by some authors for the kernels inclosed in the cones of the fir or pitch-tree; they are recommended by the old physicians in disorders of the breast.

**PITYLISMA**, a name of one of the exercises described by the ancient physicians, as of great service in chronic cases. It consisted in a person's walking on tip-toe, and stretching his hands as high above his head as he could, keeping the whole body also as much upon the stretch as might be. In this condition the patient was to walk as far as he was well able, all the while moving about both hands as much as he could, in all directions.

**PITYNERA METROPOLIS**, in *Ancient Geography*, the ancient Goleonda on the right bank of the river Nerva, a town of India, in the interior of the peninsula on this side of the Ganges, according to Ptolemy, who makes it the capital of the people called "Mefoles." On the map of M. d'Anville, it is placed on a river, which runs towards the S.W. into the Mefolus.

**PITYONESUS**, an island on the coast of the Peloponnesus, six miles from the continent, over-against Epidaurus.

**PITYRIASIS**,  $\pi\iota\tau\upsilon\rho\iota\alpha\varsigma$ , in *Medicine*, from  $\pi\iota\tau\upsilon\rho\omega\varsigma$ , *furfur*, *bran*, a slight scaly or scurfy affection of the skin, appearing in irregular patches, sometimes with, and sometimes without, slight redness or inflammation, upon which small thin scales repeatedly form and separate; but they never collect into crusts, and are not accompanied by excoriations.

Such is the character of this cutaneous affection, as pointed out by Dr. Willan, in contradistinction from the other scaly diseases of the skin, lepra, and psoriasis. The Greek writers have not precisely agreed in their acceptance of the word pityriasis. Galen, Aëtius, and Oribasius, speak of it as affecting the head only; Alexander of Tralles, however, and Paul of Aëgina, the ablest of the later Greeks, have described the disorder generally, as consisting of "slight scaly and branny exfoliations, without ulceration." All the translators of the Greek writings into Latin

Latin have rendered the word pityriasis by *porrigo*; not observing that the best Roman authority, Celsus, included under the term "porrigo" not only the *pityriasis*, but the *ceria* and *achores* of the Greeks. As, however, the *porrigo* is a contagious disease, Dr. Willan justly deemed it expedient to separate the non-contagious pityriasis from it, and included only the *ceria* (or *favi*) and *achores* under the former term. See PORRIGO.

Of this slight and non-contagious eruption, three or four varieties have been noticed. The *first* is the *pityriasis capitis*, or *dandriff* (as it is called by the nurses) of infants. This affection shews itself in a slight whitish scurf along the top of the forehead and temples, but in larger, flat, separate, semi-transparent scales on the occiput. A similar affection sometimes occurs on the scalp of aged persons. With a view to cure this form of the eruption, it is only necessary to enforce a regular ablution of the scalp with soap and water, or with an alkaline or weak spirituous lotion; for which purpose the hair must be removed, if it be not thin.

The *second* species, or *pityriasis rubra*, occurs most frequently in adult or even advanced life, and is the result of a slight inflammation of the portions of the skin affected. The cuticle is at first only red and rough, but soon becomes mealy or scurfy, and exfoliates, leaving a similar red cuticle underneath, which undergoes the like process; and as the exfoliation is repeated, the scabiness is augmented. This complaint is attended with a dry and unperispiring state of the skin, and with a troublesome itching, and a feeling of stiffness. When the redness and scales disappear, the patches are left of a yellowish or fallow hue; but the whole process is apt to be repeated at short intervals, and the disease to be thus greatly prolonged. It is sometimes accompanied with a general languor and restlessness. This form of pityriasis is removed by the decoctions of sarsaparilla, elm-bark, &c. combined with antimonials, and with the use of the warm salt-water baths.

The *third* form, or *pityriasis versicolor*, is not uncommon in adult persons of both sexes, and is most remarkable for the chequered and variegated discoloration of the skin which accompanies it. It occurs mostly about the breast and pit of the stomach, and sometimes on the arms and shoulders, in brown patches of different shades, variously branching and coalescing, and interspersed with portions of the natural hue. There is generally a slight scurfy roughness on the discoloured parts; but this is in some cases scarcely perceptible, and there is no elevation or distinct border to the patches. It is to be remarked, that these patches do not appear, like ephelides and freckles, on the face and hands, which are exposed to the sun, but chiefly on covered parts, as was long ago remarked by Sennertus, who has given an accurate description of this eruption under the appellation of "*macula hepatica*," or *liver-spots*, probably from their colour. See his Pract. Med. lib. v. part iii. sect. i. cap. 7.

The *pityriasis versicolor* is in itself of little moment; for it is not accompanied by internal or constitutional disorder, and very rarely by any troublesome sensations, if we except a slight itching when the patient becomes warm in bed, after strong exercise, or drinking warm liquors. It is sometimes, however, supposed to be the consequence of the venereal poison, from its brown and almost coppery hue. But independently of its indisposition to terminate in ulceration, however long it may remain, its distribution and situation, and the absence of all other syphilitic symptoms, will be sufficient to enable an observer of moderate experience to distinguish it. Those who have resided in warm climates seem to be most liable to this disorder. Dr. Willan has

stated, that internal medicines have not appeared to have much influence on this eruption: but Dr. Bateman is of opinion, that the oxygenated muriatic acid is possessed of some efficacy, and that the use of pitch, in the form of pills, would probably be serviceable. Externally, however, active stimulant applications have often decidedly removed the disorder; such as lotions containing alcohol, muriatic acid, or caustic potash, properly diluted with distilled water. Sea-bathing has also been found beneficial.

There is also a *fourth* variety, the *pityriasis nigra*, which seems to have been noticed only in children born in India, and brought to this country. It is said to have commenced in a partially papulated form, terminating in a black discoloration of the skin, with slight branny exfoliations; and to have sometimes affected half a limb, as the arm or leg, or sometimes the fingers and toes. See Willan on Cutan. Diseases, part ii.; and Bateman's Pract. Synopf. of Cutan. Diseases, p. 44.

PITYRODIA, in *Botany*,  $\pi\iota\upsilon\rho\delta\iota\alpha$ , branny. Brown Prodr. Nov. Holl. v. 1. 513.—Class and order, *Didynamia Angiospermia*. Nat. Ord. *Verberaceæ*, Juss. in Ann. du Mus. v. 7. 63. Brown.

Ess. Ch. Calyx bell-shaped, in five equal segments. Corolla funnel-shaped; its upper lip cloven half-way down; lower in three deep equal segments. Stigma cloven. Drupes dry at the summit, of four cells, perforated at the base. Seeds solitary in each cell.

1. *P. salicifolia*.—Found by Mr. Brown in the tropical part of New Holland. A *shrub*, with scaly or bran-like pubescence; whence the name was chosen. *Leaves* opposite, simple, lanceolate, nearly entire, rugose, with a strong smell, and nearly the taste of mint. *Flower-stalks* axillary, opposite, many-flowered, densely clustered. *Flowers* white. This genus is very nearly akin to *Callicarpa*. Brown.

PITYUS, in *Ancient Geography*, a town situated upon the Euxine sea, at the distance of 44 miles W. from Dioscurias, or Sebastopolis, which was considered as the utmost boundary of the Roman empire, according to Arrian. This city was provided with a convenient port, and fortified with a strong wall. The Goths, in their first naval expedition, met at this place with resistance more obstinate than they had reason to expect from the feeble garrison of a distant fortress; they were repulsed; and their disappointment seemed to diminish the terror of the Gothic name. As long as Suceffianus, an officer of superior rank and merit, defended that frontier, all their efforts were ineffectual; but as soon as he was removed by Valerian to a more honourable but less important station, they resumed the attack of Pityus; and, by the destruction of that city, obliterated the memory of their former disgrace.—Also, a river of Asia, in the Colchide.

PITYUSA, an island of the Ægean sea, in the Hermoniac gulf, S.E. of the peninsula of the Argolid, and S. of the promontory Bucephalium.

PITYUSÆ INSULÆ, islands of the Pityuses, or of Pines, so called on account of the number of these trees which grow upon these islands. Ebusus or Ivica, &c. belonged to this group.

PITYUSE ISLES, in *Geography*, are islands of the Mediterranean, contradicting distinguished from the *Baleares*, and so called, according to Ptolemy, Strabo, and Pomponius Mela, from the Greek word  $\pi\iota\upsilon\sigma$ ; a pine, whence  $\pi\iota\upsilon\sigma\sigma\alpha$ , abounding in pines. These are Ivica, which is the largest, (see IVICA,) Fromentera, S. of Ivica, separated from the coast by a channel one league and a quarter in breadth, three leagues in extent from E. to W., and from two leagues to a quarter of a league in breadth, containing about 200 inhabitants, and supplying

plying wood, stone, and corn, from which last article it is said to derive its present name; the three Conejas to the west of the former, which, though of considerable extent, are destitute of habitations, and furnish food for the flocks of the neighbouring isles; three small islands, called the gates of Ivica; the isle of Grossa; the isles of Santa Eulalia y de Arabi, lying towards the E.; the isles of Margueritas, &c. The inhabitants of these islands, the climate of which is mild and healthy, pay little attention to commerce; but as the land, which is mountainous and well wooded, is adapted to all sorts of husbandry, the occupiers cultivate olives, vines, and corn; and raise from these productions a greater quantity than they consume; but they are forbidden to export corn, oil, and fruits, and therefore, notwithstanding the richness and productiveness of their soil, they almost all live in a sort of indigence; salt and wool are the only commodities which are exported in foreign bottoms. Their habits are much the same with those of the inhabitants of the Balearic islands, one of the chief of which is indolence; their language is also much the same. They keep a number of holidays, which they devote to the purposes of religion, or superstition; and they have assemblies and some amusements. They are reckoned courageous, and display proofs of valour in their contests with the pirates on the coast of Barbary. The people are in general ignorant, and have hitherto little availed themselves of any opportunities or means of improvement.

PITZEN, a town of Prussia, in the province of Bartenland; 9 miles S.S.W. of Rastenburg.

PITZIUNTA, or DANDAR, a town of Circassia. N. lat. 43° 45'. E. long. 59° 10'.

PIVA, *Ital.*, a bagpipe. See CORNAMUSA.

PIUHEGA, in *Geography*, a town of Italy, in the department of the Mincio; 4 miles N. of Mantua.

PIVOT, or PEVOT, a foot or shoe of iron, or other metal, usually conical, or terminating in a point; whereby a body intended to turn round bears on another fixed at rest, and performs its circumvolution.

The pivot usually bears or turns round in a sole or piece of iron or brass, hollowed to receive it.

Large gates, &c. usually turn on pivots. The ancients tell us, they had theatres in Rome, that held eighty thousand people, which have yet turned on a single pivot.

PIVOT (*Fr.*), in *Military Language*, is that officer, serjeant, corporal, or soldier, upon whom the different wheelings are made in *military evolutions*; which see. Of these pivots, two sorts are distinguished according to the position of the troops that are governed by them; *viz.* *standing* and *moveable* pivots. When a battalion, *e. g.* stands in open column of companies, the "right in front," the last man upon the left of the front rank of each company, is called the *inner*, or *standing* pivot; and the first man upon the right ditto is called the *outer*, or *wheeling flank*. The accurate position of the different pivots is an object of great importance with regard to military movements, and officers, in particular, ought to recollect, that when they are posted upon the flanks, they become absolutely necessary to the preservation of that perpendicular and parallel order of a march, without which direction, the best concerted manœuvres must be ultimately rendered useless. At the instant when an officer has wheeled his division, he must resume his perpendicular position, look steadfastly on his leading pivot, maintain his relative distance, and keep his person perfectly square. He ought likewise to be particularly correct in stepping off when the wheel is completed. The *moveable* pivot is one which, during the wheel of its division, advances in a circular direction, instead of turning on the spot where it origi-

nally stood. Thus, when divisions, &c. are successively wheeled, without being first halted, the pivot upon which they wheel is said to be *moveable*. In the drill, single ranks are frequently wheeled on a moveable pivot. In which case, both flanks are moveable, and describe concentric circles round a point, which is a few paces distant from that which otherwise would be the standing flank; and all eyes are turned towards the directing pivot man, whether he is on the outward flank, or on the flank to which the wheel is made.

PIVOT-Flanks, the flanks upon which a line is formed from column. When the right of the battalion is in front, the pivot-flanks are on the left of its several companies, platoons, &c. and *vice versa*, when the left is in front.

PIVOT-Flank Officer, the officer who is on the first flank. In all wheelings during the march in column, the officer on that flank upon which the wheel is made, must consider himself as the pivot.

PIVOTS, *Platoon*, the men upon whom a battalion marches in column of platoons, is wheeled up into line, or backward into column, when the line has been formed according to a given point.

PIURA, in *Geography*, a river of Peru, which runs into the Pacific ocean, S. lat. 5° 33'.

PIURA, a town of Peru, and capital of a jurisdiction of the same name, in the bishopric of Truxillo. This was the first Spanish settlement in that country, and was founded in the year 1531, by don Francisco Pizarro, who built the first church in it. It stood first in the valley of Targafale, and was called "St. Miguel di Piura;" but it was removed, on account of the insalubrity of the air, to its present situation, on a sandy plain. The houses are constructed either of bricks baked in the sun, or of a kind of cane called quincas, and they have generally only one story. The corregidor, and an officer for collecting the royal revenue, reside here and at Payta six months alternately. The town contains about 1500 inhabitants, none of whom are persons of distinction. Although the climate is hot and dry, it is not upon the whole unhealthy. As the country is level, water is easily conveyed to different parts by canals. But in summer, when water is scarce, they are under a necessity of procuring it by digging wells in the bed of the river. This town has an hospital, under the care of the Bethlehemites, which is remarkable for the cures afforded to a great number of persons labouring under the venereal disease; 25 miles S.S.E. of Payta. S. lat. 5° 15'. W. long. 80° 40'.

PIUS I., pope, in *Biography*, a native of Aquileia, who flourished in the second century, was probably the successor of Hyginus, and in that case commenced his pontificate about the year 143. According to Eusebius, he died in the year 157. Other historians, as Cave, Pearson, and Dodwell, imagine that he presided over the see of Rome between the years 127 and 142, while Bellarmine and Baronius date his elevation to that high dignity in the year 158. In the Roman martyrology he is said to have suffered death, for the sake of his religion, under the reign of Antoninus Pius, but there seems no good authority for this fact, and the title of martyr is not given to him by Irenæus. Two "Letters" to "Justus of Vienne," which were formerly attributed to Pius, may be found in the second volume of the "Orthodoxographia," and likewise in the "Bibl. Patrum," but they have long since been given up as spurious, and allowed to be the production of a much later age. Moreri. Bower.

PIUS II., pope, whose original name was Æneas-Sylvius-Piccolomini, was descended from one of the most illustrious families of Sienna, in Tuscany, which had been expelled

pelled from that city, together with the rest of the nobility, by the popular faction, and settled at the small town of Corignano. At this place he was born in 1405, and afterwards initiated in the rudiments of grammar learning, but by the losses sustained by his father in those times of trouble and turbulence, he was unable to procure for Æneas the benefits of a college course of education, and the youth was under the necessity of assisting in the labour by which the family was supported. His talents and desire of literary improvement led some of his friends and relations, about the year 1428, to send him to the university of Sienna, where he was maintained at their expence. He quickly afforded strong proofs of an extraordinary genius. He applied himself with ardour to the study of the belles lettres, making himself acquainted with the writings of the poets and orators, and during his academical course, he published several Latin and Italian poems, which were received with applause by the learned. After this he directed his attention to the civil law. In the year 1431, his learning and accomplishments recommended him to the notice of cardinal Cronica, whom he accompanied to the council of Basil in the capacity of secretary. Here he gained the confidence of the fathers, by the zeal with which he espoused their cause against pope Eugenius, and the many learned and elegant speeches which he made, to prove the superiority of general councils over the bishops of Rome. He was immediately raised to the important offices of secretary to the council, clerk of the ceremonies, abbreviator of the letters, and one of the collators to benefices. He was also employed by the council on missions of importance to Trent, Constance, Frankfort, Swabia, Straßburg, Savoy, and the Grisons, and as a compensation for his very useful services, he was presented to the provostship of the collegiate church of St. Lawrence at Milan. He was superior to the threats and anathemas of Eugenius, and continued firm in his adherence to the fathers, while a multitude of others deserted their cause through fear. His example prevented many from defection, who were wavering as to the side they should espouse. On account of his resolution and zeal, when the council passed sentence of deposition against the pope, in the year 1439, and elected Amadeus, duke of Savoy, in his stead, Æneas was made secretary to the newly elected pontiff. Shortly after this, he was sent to promote the interest of Felix, at the court of the new emperor, Frederic III., where he was honoured by that sovereign with the title of poet-laureat, and even admitted into the number of his personal friends. In 1442 the emperor prevailed upon him to resign his other offices, and to enter wholly into his service, on which occasion he was made prothonotary, or secretary to the empire, and distinguished with the dignity of senator. From this time he appears to have had higher objects of ambition than he had before conceived, and he omitted no means of strengthening his own interest, by adopting all the sentiments of his imperial master. When, therefore, the emperor embraced a neutrality between the council of Basil and Eugenius, Æneas, notwithstanding what he had before done, followed his master's example. Afterwards, when the emperor seemed inclined to the cause of Eugenius, in opposition to that of the council and Felix, Æneas conformed himself to his sentiments, and represented his person at the diet of Ratibon, where the means of putting an end to the schism in the church were taken into consideration. At length, in 1446 and 1447, he was sent by Frederic to Rome, to negotiate the submission of Germany to Eugenius; of which opportunity he availed himself to shew contrition for his past conduct, and solicit with all humility the forgiveness and favour of his holiness. Eugenius met his

wishes, but did not live long enough to bestow upon him any substantial mark of his regard. By his successor, Nicholas V., Æneas was preferred to the vacant see of Trieste, in Istria; and upon his return to Germany he was made one of the council to whom was entrusted the management of the most important concerns of the empire. Four years afterwards he was translated to the vacant see of Sienna. In the year 1451, he accompanied Frederic to Rome, when he went thither to be crowned by the pope, and on his return, the bishop was invested with the legantine power over Bohemia, and the whole Austrian dominions. After this, in the year 1456, he was promoted by Callixtus III. to the dignity of cardinal, and upon the death of that pontiff he attained the great object of his ambition, being raised, by the unanimous suffrages of the conclave, to the popedom, and at his coronation, he assumed the name of Pius II. Much was expected from him on account of his great learning, and the zeal which he had formerly shewn in setting forth the corruptions that had been introduced into the church. He, however, soon convinced his friends, and the friends to a better order of things, what they had to hope for now he was elevated to the highest station in the world. His ambition was gratified, and what formerly had been deemed corrupt principles and practice, he found means to justify, or at least overlook. One of the first measures of his government was an attempt to unite the Christian princes against the Turks: for this purpose he appointed a council to meet at Mantua in 1459, at which he invited all those princes to attend, either in person or by their ambassadors, for the purpose of deliberating on the most effectual methods of delivering Christendom from the bondage with which it was threatened by those formidable enemies. At this council Pius himself presided, and the attendance of princes or their representatives was very numerous; but their various and opposing interests rendered all the endeavours of the pope to unite them quite ineffectual, and the council broke up without concurring in any resolution to oppose the progress of the common enemy. He next declared the kingdom of Naples devolved as a fief of the church to the apostolic see, and confirmed the bull of king Ferdinand's legitimation, upon his restoring to the church some places that had been captured by his father. He also granted Ferdinand the investiture, and sent a cardinal to perform the ceremony of his coronation. The king, on his part, engaged to assist the pope against his enemies with the whole strength of his kingdom. To secure the throne of Naples to Ferdinand, Pius ordered all the clergy and barons, under pain of excommunication, to acknowledge him, and no other, for their lawful sovereign, and sent a body of troops to his assistance when John of Anjou invaded the kingdom. In 1460 he gave a most decided proof of his bad faith, by publishing a bull, condemning the doctrine, which he had formerly defended, of the superiority of a general council to the pope, and forbidding all appeals to such a council under the severest penalties. He also attempted to obtain from Charles VII. king of France, the revocation of the *PRAGMATIC Sanction*, (see that article,) which he pronounced to be an edict highly derogatory to the honour and dignity of the holy see. This edict had been drawn up by Charles, or at least by the prelates of his kingdom, and it was thought necessary, in order to deliver the French clergy from the vexations which they suffered from the encroachments of the popes, ever since the latter had fixed their residence at Avignon. It had been drawn up in concert with the fathers of the council at Basil, and the articles of which it consisted were taken from the decrees of that council. In answer to Pius's request, the French king

replied, that the edict consisted of the very decrees of the council of Basle, which Pius himself had approved, had penned, and probably had suggested, when secretary to that assembly, and which it had received with one consent, and observed for the space of twenty-five years by the whole French nation. Upon the death of Charles, the pontiff renewed his application to his successor Lewis XI., who consented to abolish the edict by a solemn declaration, for which he and his successors were rewarded by the title of "Most Christian," a title which descended uninterruptedly to Lewis XVI., and was only abolished with the destruction of the monarchy. Though the king thus degraded himself by becoming a tool to the pope's ambition, his council better consulted the dignity of their sovereign, and their own reputation, by resisting, to a man, the pope's demand; and the full execution of Lewis's declaration was prevented by the noble stand made by the university of Paris, and the parliament, in favour of the "Pragmatic Sanction."

During the years 1462-3, Pius again, but unsuccessfully employed all his talents and eloquence in endeavouring to unite the Christian princes against the Turks, who had at that time made themselves masters of almost all Greece. Finding his efforts of no avail, he equipped a fleet at Ancona, avowing his determination, notwithstanding his age and bodily infirmities, to face the inconveniences and dangers of war, imagining, that with such an example, the Christian princes would be ashamed of remaining quiet and inactive at home. While, however, he was thus busily employed, he fell sick, and was advised by his physicians to pay a visit to Sienna, for the benefit of his native air. Before he left Rome, he published a solemn retraction of all that he had written in favour of the council of Basle, and declared, without shame or hesitation, that, as Æneas Sylvius he was a damnable heretic, but as Pius II. he was an orthodox pontiff. After a very short stay at Sienna he returned to Rome, but being informed of the inroads of the Turks, and that they had actually laid siege to Ragusa in Dalmatia, he set out without delay for Ancona, though at that time he was in so infirm a state of health, as to be obliged to travel in a litter. The journey, however, proved too much for him, and he died in the summer of 1464, at the age of fifty-nine, having filled the pontifical throne six years within a few days. According to Platina, he was endowed with every virtue that became his exalted state; but the conduct of the pope certainly militated against the excellent qualities which he had displayed, previously to his advancement to that high dignity. No man ever laboured harder, and perhaps few more successfully than Æneas Sylvius, to restrain the power of the pope within the boundaries admitted by the canons, and no pope ever strove more than Pius II. to extend that power beyond all the bounds of reason and law. To effect his purposes, he spared neither kings, dukes, nor people, when he assumed that they invaded the rights of the church, or entrenched upon the emoluments of the clergy. When young he indulged his passion for the sex without restraint, and in his more mature years, he seems to have thought transgressions against the rules of chastity to be very venial sins, if they could even be denominated sins. As a scholar, he was an elegant writer in Latin, and left behind him various works, most of which he composed before his elevation to the papedom. Of these an abridged list is given in the General Biography, but a complete catalogue of them may be found in Cave and Dupin. The following seem to be the most generally important: "Comment. de Gestis Concilii Basiliensis;" "De Ortu, Regione, ac Gestis Bohemorum ad Ann. 1458;" "Cosmographie, seu Historiarum de Mundo universo;"

"Epistolarum Liber," containing four hundred and thirty-two letters, many of which are interesting and curious. The whole works of this pope were published in a collective form at Basle in 1551, and again at Helmstadt in 1700. A history of his life was published at Rome in 1584, which was generally believed to have been drawn up by himself. Moreri. Mosheim.

PIUS III., pope, whose original name was Francis Todeschini, was a native of Sienna, and born in the year 1429. He was nephew on the maternal side to Pius II., and was permitted to take the name of Piccolomini, and to bear the arms of that family. When he was but twenty-two years of age, Pius raised him to the dignity of cardinal, and nominated him to the bishopric of Sienna. He was employed in several legations by popes Paul II., Innocent VIII., and Alexander VI., to whom he gave the most entire satisfaction, by the prudence and integrity with which he discharged the several commissions and high trusts reposed in him. Upon the death of Alexander VI. in 1503, the city of Rome was thrown into the utmost confusion by the struggles for power between Valentine Borgia, the son of Alexander, and the Orsini, and others whom he had deprived of their estates. Scarcely a day passed in which there were not battles fought in the streets by the partisans of these rivals. The cardinals, therefore, found it quite necessary to raise a considerable body of troops for their own defence, while they should be shut up in conclave. They also applied to the ambassadors then residing in Rome, by whose means the heads of the opposite factions were prevailed upon to withdraw from the city, till the election of the new pope should be declared. The choice soon fell upon Piccolomini, who, out of grateful respect to the memory of his uncle, assumed the name of Pius III. As soon as the intelligence of his election had reached the hostile factions, they returned to Rome, and renewed the war within the walls, throwing the city into the utmost confusion. Valentine was soon obliged to submit to the enemy, and he was then left to the mercy of the pope, who permitted him to retire unmolested wherever he pleased. Pius, by this event, had the happiness to see peace restored to the city, but he did not live long to enjoy it, as he died on the 26th day after his election, being in the 75th year of his age. It was generally believed, that he was taken off by poison. He was regarded as a person of unblemished moral conduct, and in every respect worthy of the high dignity to which he had been raised. Bower. Moreri.

PIUS IV., pope, whose original name was John Angelo di Medici, was born at Milan in the year 1499. He wished to be thought a branch of the famous house of Medici, to which he had no real pretensions, being, in fact, of low origin, and whose real name was Medicino instead of Medici. He enjoyed the advantages of a liberal education; and having applied himself chiefly to the study of the civil law, he was in early life admitted to the degree of doctor. After this he practised with high reputation as a civilian, and by his abilities, united with the interest of a brother, he obtained the office of protonotary under Clement VII. In this situation he recommended himself to the favour and patronage of cardinal Farnese, who, after his elevation to the papal dignity under the title of Paul III., employed him in various legations. By the same pope he was appointed commilitary to the army of the church; nominated archbishop of Ragusa; and created cardinal priest of Santa Prisca in the year 1549. Upon the death of pope Paul IV., in 1559, the conclave was agitated for more than four months by the intrigues of different cardinals of noble families, whose power was so equally balanced, that neither of them

them could obtain the requisite superiority over his rivals; till at length, wearied out with their fruitless struggles, they gave their united votes in favour of the cardinal of Santa Prisca; who, at his consecration, took the name of Pius IV. He began his pontificate with granting a general pardon to all who had been concerned in the outrages committed since the death of his predecessor, and he then took measures for bringing to justice the persons whose oppressive enormities had provoked them to their irregular conduct. The Caraffas were accordingly arrested, tried, and convicted of crimes, for which they were condemned to forfeit their lives and their estates. The cardinal was, in pursuance of the sentence, strangled; and his two brothers, the duke of Pagliano and marquis of Montebello, were beheaded, with several of their accomplices. One of the early measures of this pope's administration was to terminate the differences between the papal and imperial courts, occasioned by the late pope's refusal to approve Ferdinand's succession to the imperial crown, resigned to him by his brother Charles V., without applying in the first instance for the consent of his holiness. He next adopted certain measures, with a view, if possible, of putting a stop to the progress of the reformation. The power and influence of the Protestants were now every day becoming more and more considerable. England and Scotland had disclaimed allegiance to the see of Rome, and had new-modelled their religion. In the Netherlands, the reformers had greatly multiplied; and in France, there was reason to apprehend that they soon might become too powerful for the Catholics. The new opinions had penetrated even to Italy. From Naples they were extirpated by Philip II., who issued orders to his viceroy to put all heretics to death without mercy. But the duke of Savoy was inclined to attempt to enlighten and convert them; and, with this view, he desired the pope's permission to hold a conference of the principal ecclesiastics in his dominions, on the subject of religion. France determined to have recourse to the same expedient. The pope promised that he would summon a general council without delay, which he did, to meet at Trent. The bull was drawn up in such equivocal expressions, as might be interpreted to signify either a new council, or a continuation of the former one at the same place. The emperor, the French king, Philip, and the other Catholic princes, received the bull, and gave orders to the ecclesiastics in their dominions to repair to Trent, at the time appointed. An invitation to attend was also sent to the several Protestant powers; but they all resolved to give no encouragement to a council, which was called by one whose authority they could not acknowledge, and in which only those were to have decisive votes, who had sworn allegiance to the pope and the see of Rome. The council opened in January, 1562. Attempts were soon made to abridge the authority of the pope, which created in his holiness perpetual anxiety, and he was on the point of suddenly dissolving the assembly; but he found it more expedient to flatter and cajole, than to have recourse to violent measures. In 1563 it was brought to an end, but not until decrees were passed, designed as an acknowledgment of the subordination of the council to the holy see. When information of the dissolution of the council was brought to Pius, he received it with great joy, and ordained a solemn thanksgiving on the occasion; and in a very short time, he published a bull of confirmation, requiring all the prelates and princes to receive and enforce the decrees of the council of Trent, prohibiting persons from writing any explication or commentary of them, and commanding the Catholics every where to have recourse in all doubtful cases to the apostolic see. By the republic of

Venice, the several Italian princes, most of the Catholics in Germany, and the king of Spain, the authority of the council was acknowledged, and the decrees received; in some countries, without any limitation whatever; but in Spain, and all through the Spanish dominions, with the clause, "Saving the rights of the crown, and the privileges of the subjects." Pius had the mortification to find that they met with a different treatment in France. The court refused to receive and publish the decrees, as derogatory to the liberties of the Gallican church, and the rights of the crown. In the year 1564 the pope, at the pressing instance of the emperor Maximilian II., granted the use of the cup to the laity of Austria and Bohemia; but he could not be persuaded to consent to the marriage of the priests, though earnestly intreated by the emperor, and the other Catholic princes of Germany, who declared that they could no longer bear with the impure celibacy of the clergy. This pope died in 1565, in the 67th year of his age, and after a pontificate of nearly six years. That event is said to have been accelerated by his apprehensions for the loss of Malta, which was then besieged by the Turks. The news of the fact was received with great joy by the Roman people, who hated the pontiff, on account of the severity and oppression of his government. This hatred, united with religious enthusiasm, had given rise to a conspiracy against him not long before his death; but it was discovered, and the parties concerned in it were executed with much torture. Pius is praised for the vast sums which he laid out on public works, for the convenience and ornament of Rome. According to Onuphrius, he was possessed, or at least seemed to be possessed, while cardinal, of every virtue that could render him worthy of the high station to which he had been raised; but no sooner had he attained the summit of his ambition, than he abandoned himself, without restraint, to all the opposite vices; stopping at no means of accumulating wealth, that he might enrich and aggrandise his nephews and other relations.

PIUS V., pope, whose original name was Michael Ghislieri, was descended from an obscure family, and born at Boschi, a small town near Alexandria, in the north of Italy, in the year 1504. When he was fourteen years of age, he embraced the monastic life in a Dominican convent, where he was soon distinguished by the strictness of his conformity to the rules of the order, and acquired a high character for piety and virtue. He was ordained priest at Genoa, and became a very celebrated preacher, being master of a most powerful and persuasive eloquence. Afterwards he was elected prior of the convent of Vigevani, and nominated inquisitor by cardinal Caraffa, commissary-general of the holy office, who had conceived a strong attachment to him. In a short time after, that cardinal was elevated to the papal throne, under the name of Paul IV. He made Ghislieri bishop of Sutri; and when, in the year 1557, our prelate was preparing to resign his dignity, and to return to the monastery, he was prevented by the interposition of his holiness, who promoted him to the purple, by the title of cardinal *de sancta Sabina*, though he was most commonly known by the name of cardinal Alexandrini, from his native country. He was, at the same time, appointed to the post of commissary-general to the inquisition. This office he executed with so much severity in the Milanese and Lombardy, that he was obliged to quit those countries; and his zeal was afterwards checked by the government, when he attempted to discharge the functions of inquisitor at Venice. Pius IV. translated him from Sutri to the see of Mondovi; and upon the death of that pontiff in 1566, by the unanimous suffrages of the conclave, he was elected his successor, when he

he assumed the name of Pius V. The people expressed no joy at his coronation: they dreaded a severe government under a man, in whose rigid and austere manners his successive promotions from the condition of a simple monk had made no change. Sensible of the coldness of the reception he met with, he observed to those about him, "I hope that, some time hence, the Romans will be as sorry for my death, as they are now grieved at my advancement." To render his name worthy of the grateful remembrance of virtuous and good men, he displayed great zeal and diligence in promoting a reformation in the manners and morals of all ranks of the people. He repressed the excessive pride and ostentation of the cardinals, as well as the luxury in dress and mode of living of the other orders of the clergy. He gave directions for banishing all the prostitutes from Rome, and he prohibited the bull-fights in the circus, as well as all other diversions which had a tendency to promote irregularity and dissipation among the lower classes. He gave directions for strictly enjoining on the clergy residence, and commanded that no persons should be admitted to ecclesiastical benefices, who would not reside; and when he was told, that a strict adherence to such a decree would cause the court of Rome to be deserted, he replied, that it was better that the court should be deserted, than that the service of the altar should be neglected. He ordered his own relations to retire from Rome, providing them all with small pensions for their subsistence, excepting two nephews, who were attached to study; one of whom, Michael Bonello, who possessed shining talents and an excellent disposition, he was persuaded by his friends to raise to the dignity of cardinal. While Pius V. was engaged in introducing a partial reformation among the ecclesiastics and community of Rome, he displayed a furious zeal against the Protestants, by persecuting them with the same savage severity, which rendered him odious in his former character of inquisitor. Peter Carnesecci, a person of distinction at Florence, was, by his express order, condemned to the flames, after having been convicted of corresponding with some of the reformed religion in Germany, and with some of his countrymen in Italy, who were suspected of heresy. Aonius Palcarius (see his article), one of the ornaments of his age as an elegant and liberal scholar, underwent the same fate, for saying that in some things the Lutherans were excusable, particularly for calling the inquisition "the dagger drawn against literature in general." Not satisfied with his endeavours to extirpate the reformed opinions out of Italy, he, in 1568, encouraged Charles IX., king of France, to make war upon his Protestant subjects; sending a considerable body of troops to join the royal army, and permitting some of the estates of the church in France to be alienated, in order to supply funds for carrying on hostilities. Pius V. was not outdone by any of his predecessors in zeal for maintaining the high claims of the papal see. In 1568 he published his famous bull, entitled "In Cœna Domini," which it was usual to publish at Rome on Maundy Thursday every year, till it was suppressed by pope Clement XIV. By this bull, anathemas were pronounced against such persons as should appeal to general councils from the decrees of the popes, and against those princes who should impose restraints on ecclesiastical jurisdictions, or exact contributions from the clergy. This bull, evidently calculated to deprive princes of their sovereignty, and to render them and their subjects entirely dependent on the will of the Roman pontiffs, was never received in any kingdom out of Italy. Some French bishops did, a few years afterwards, attempt to introduce it into their dioceses; but their offence against the liberties of the Gallican church was most severely punished. In

1569 Pius conferred the title of grand duke of Tuscany upon Cosmo de Medici, duke of Florence, who went to Rome, where he received the crown at the hand of his holiness; and during the same year, the pope issued a bull of excommunication against Elizabeth, queen of England, absolving her subjects from their allegiance. This paper was fixed up in the night on the bishop of London's palace, and in other parts of the metropolis; but it was very harmless, for none but a few bigotted Catholics noticed it with the smallest regard: they indeed endeavoured to excite some commotions, but their efforts were fruitless, and for the feeble attempt they paid the forfeit of their lives.

In the year 1571, the zeal of this pontiff was directed against Selim the Turkish sultan, who, in violation of a solemn treaty, had invaded the island of Cyprus. The Venetians, to whom the island belonged, solicited his holiness to employ his influence in procuring assistance for them from the Christian princes. With their request Pius readily complied. He was, however, successful in his application only with Philip II., who, without hesitation, entered into a league with his holiness and the republic, by which he bound himself to pay one-half of the expence of a powerful armament which it was judged necessary to employ, while the Venetians engaged to defray three-fourths of the other half, and the pope the remainder. The preparations of the combined powers were carried on with so much celerity and dispatch, that about the middle of September a fleet was ready to sail from Messina, consisting of more than 250 ships of war, and other vessels, carrying nearly 50,000 men. The command of this mighty armament was given to don John of Austria, whom the pope, indulging the most sanguine hopes with regard to the issue of the war, exhorted to embrace the first opportunity of engaging with the enemy, assuring him that he would obtain a complete victory. He sent him, at the same time, a consecrated standard, and a number of ecclesiastics to officiate in sacred things on board the ships; and, moreover, he ordered a fast and jubilee to be proclaimed, with an absolution from their sins to all who should acquit themselves with honour against the infidels. A victory was soon afterwards obtained by this fleet over the Turks near the gulf of Lepanto, the intelligence of which spread universal joy throughout all Christian Europe. When the important news was brought to the pope, he cried out, in the words of sacred writ, "There was a man sent from God, whose name was John," in reference to the prince under whose command the victory was obtained. (See *JOHN of Austria*.) Pius survived this event only a few months, and was carried off by an attack of the stone in 1572, when he was about the age of sixty-eight, after a pontificate of little more than six years. Notwithstanding his defects, compared with many of his predecessors, his name appears with honourable distinction among the list of popes. He was a lover and patron of learned men, and scarcely preferred any persons to considerable dignities who were not strongly recommended by their abilities, and the endowments of their minds. In his private conduct he was irreproachable and exemplary. He was beatified by Clement VIII., and canonized in 1712 by Clement XI. A volume of his letters was published at Antwerp in 1640, under the title of "*Apostolicarum Pii Quinti Pontificis maximi Epistolarum, lib. v.*" Moreri. Bower.

PIUS VI. pope, originally known by the name of John Anthony Braschi, was descended from a noble, but reduced family, and born at Cesena, a small town belonging to the ecclesiastical state, in the year 1717. Being destined for the church, and possessing a promising capacity, he received the best education that could be procured. His  
splendid

splendid talents recommended him to the patronage of cardinal Ruffo, who appointed him to the post of uditore; a charge which, in the establishment of the Roman church, comprised the offices of vicar, counsellor, and assistant. In this situation he conducted himself with so much good sense, probity, and zeal, that he secured the affection of the cardinal, and acquired the reputation of being one of the best informed persons in Rome. As a mark of his esteem for Braschi, this generous prelate, when on his death-bed, left him the continuation of his appointment for life, and such was Braschi's veneration for his patron, that, out of respect for his memory, he retained the situation of uditore, even after he became pope. He continued to make rapid advances in the church, and under the pontificate of Clement XIV., more generally known by his family name of Ganganelli, Braschi was raised to the purple; and in this progressive advancement, he constantly displayed a love of justice, the strictest morality, close application to business, and the most unassuming manners. After the death of Clement XIV., cardinal Braschi was raised to the pontifical throne, and he was proclaimed pope under the title of Pius VI. He began his government with correcting various abuses which had taken place in the internal administration of affairs, as well as in the police of Rome, and with endeavours to restore the dilapidated finances to order and regularity. With this view he liberally patronized several useful reforms, and beneficial establishments in the state. Soon after his accession he had a difference with the court of Naples, which led him to display great firmness in support of his dignity. The king of the two Sicilies had appointed M. Filangeri, formerly viceroy of Sicily, to the archbishopric of Naples; and as the laws of that metropolis required that the archbishop should be a cardinal, application was made to Pius VI. to bestow upon him that dignity. The pope returned for answer, that although the laws enacted that a cardinal should be the archbishop, it did not follow that the archbishop should become a cardinal; and that his majesty, who could not be insensible of the difference, might have promoted to the archbishopric some one or other of the Neapolitan cardinals residing at Rome, instead of thus indirectly assuming authority to confer one of the greatest dignities of a foreign hierarchy on one of his subjects. The pope was resolute, and Filangeri actually died of a broken heart, in consequence of the refusal. Pius VI. derived real and very great honour from the works of magnificence and utility, on which he expended the revenues of his see. He augmented and completed the noble Clementine Museum in the Vatican, founded by his predecessor, as a receptacle for the monuments, vases, statues, medals, and other remains of antiquity, which were procured by excavations in the estates of the church. The engravings and descriptions of the treasures in this collection were afterwards published in six volumes folio. He projected and finished the erection of the present majestic vestry of St. Peter's. He built a church and established a library in the abbey of Subiaco; he founded a number of hospitals for the relief of the sick and indigent; and he shewed a great regard for the interests of commerce by repairing the port of Ancona, and erecting the beautiful light-house, which is at once an ornament to the city, and of the highest utility in the navigation of the Adriatic sea.

But the greatest economical undertaking of this pontiff's administration, was the draining of the Pontine marshes; and if he did not completely succeed, yet he is not entitled to less praise for the grandeur and utility of the attempt. The marshes extended upwards of forty miles in every di-

rection, occupying the whole valley from the Apennines to the sea. To fit this vast space for the purposes of agriculture, and by so doing to purify the air from pestilential vapours arising from it, had been an object that employed the thoughts and the labours of the censor Appius Claudius, who carried through it the famous Appian way. Several of the Roman emperors, and several of the popes had directed, at different times, their attention to the same design, and though all their attempts had been unsuccessful, Pius VI. resolved to undertake the arduous work. He employed the best engineers in Rome, and went regularly every year to inspect, in person, the progress which they had made. He caused immense canals to be dug, for the purpose of receiving the water from the marshes, and by this means rendered considerable tracts of land fit for husbandry. On the side of these canals he constructed a large and beautiful road, about forty miles in length, ornamented with four rows of poplar trees, and interspersed with houses of accommodation; and at its termination he built a large and splendid palace. Pius likewise displayed his magnificence in the reception which he gave to several royal personages from various parts of Europe, who came to visit Rome during his pontificate, among whom were Joseph II. emperor of Germany; Paul, then grand duke, afterwards emperor of Russia; Gustavus Adolphus, king of Sweden; and his royal highness of England, prince Augustus Frederic, the present duke of Saxe, illustrious as well for his attachment to the principles of civil and religious liberty, as for his high birth.

Pius VI. spent the first six years of his pontificate in the most perfect tranquillity, excepting the difference, which has been referred to, with the court of Naples, occupied in regulating the internal government of his state, and in carrying on the undertakings already noticed. Soon after the death of the empress queen, Maria Theresa, towards the end of the year 1780, he began to feel mortifications and afflictions in abundance. As soon as Joseph II. came into possession of his hereditary territories, he began to carry into execution the schemes which he had long formed for promoting a reform in ecclesiastical affairs, and emancipating his subjects from papal jurisdiction. With this view he issued edicts and ordinances, by which the secular clergy were subjected to lay-magistrates: all donations to religious houses, by those who should enter them, were prohibited; various religious houses, in all parts of his dominions, were suppressed; all Austrian, Hungarian, and Lombard bishops were enjoined never to accept the dignity of cardinal; all subordination to the holy see in secular affairs was disclaimed, and many other vigorous steps towards a complete emancipation were pursued. These proceedings excited the greatest alarm in the breast of Pius VI. At first he hoped that some opposition would be made to such innovations by the imperial subjects themselves; and he was encouraged in that hope by the strong remonstrances which were sent to the emperor, from the clergy of Brabant, Flanders, and Lombardy. They, however, produced no effect on Joseph, who persisted in his schemes, supported by the assistance of the lay magistrates and the military power. Even the archduke Ferdinand, his brother, had been nearly deprived by him of the government of Lombardy, for seconding the remonstrances of the Milanese clergy. Under these circumstances, his holiness thought it high time to remonstrate himself against the imperial measures, and directed his nuncio at the court of Vienna to present the most pressing solicitations to his majesty, that he would consider the consequences of his proceedings. But these produced no effect whatever, and the prince Kaunitz told him,  
that

that his matter was fully aware of the effects of what he had done, and was determined to carry into execution all the edicts that he had issued.

The thunders of the Vatican were no longer objects of terror, and of this Pius VI. was fully aware; he therefore resolved to try whether his personal entreaties might not have the effect of prevailing with the emperor to desist from his hostile purposes. He accordingly determined to visit that prince at Vienna. This determination was highly disapproved by the members of the sacred college; Pius was, however, resolute, saying that he had rather submit to humiliation in his dignity than remorse in his conscience. At that time, inauspicious as his prospects were, he little thought of the afflictions that were in reserve for him in another quarter, and from another power than on the best terms with the papal see.

The pope, after the fatigues of a winter's journey over the Alps, arrived at Vienna in March 1782, where he was received by the emperor with every mark of external respect, and who treated him with the same distinction as if he were in possession of that vast power which his predecessors had enjoyed, and was reigning in his own capital. The emperor and pope had repeated conferences on the subject of the changes which Joseph was making in ecclesiastical matters; but the arguments of Pius were not sufficiently strong to induce the emperor to repeal any of his late edicts, and he could only obtain a respite for some religious foundations which were threatened with dissolution. While Pius continued at the Austrian capital, he is said to have received several Protestant princes, noblemen, and clergy, with the greatest affability; and it has been likewise asserted, but upon no proper evidence, that he converted to the Catholic religion many thousand Protestants, who had come to Vienna for the purpose of seeing him perform the duties of his high office on Easter Sunday. After the pope's return from his visit to Vienna, he employed much of his time in the improvement of his temporal dominions, and in the enriching and aggrandizement of his own relations. One nephew he made a cardinal, and another he raised to the dignity of a ducal coronet, circumstances that created much disaffection to his government from the people, who saw them grow wealthy by the plunder of the estates belonging to the apostolical chamber, and the most oppressive public spoliations. In the mean time he was involved in new disputes with the court of Naples, which, encouraged by the example of the emperor, had abolished some of the prerogatives that the court of Rome had for ages been accustomed to exercise in the Neapolitan dominions, as well as the singular custom of delivering a white horse to his holiness on St. Peter's day, as a token of feudal vassalage to the holy see. In 1787 the matter was carried much farther, and the king of Naples absolutely prohibited any appeal from his decisions to the court of Rome, and at one blow abolished for ever certain feudal homages which he conceived as disgraceful to his own dignity any longer to submit to. When the pope heard of these proceedings, he issued a solemn protest against the innovations made by them on the sovereignty of the holy see over the kingdom of Naples. He sent his internuncio to Naples with certain apostolical bulls; but the decrees produced no effect, and the messenger of them was banished the kingdom of Naples. This was in the autumn of the year 1788, at a time when Pius had a misunderstanding with the grand duke of Tuscany, respecting some innovations of the bishop of Pistoia; this at length changed into a violent quarrel, in which the grand duke undertook to annihilate the spiritual power of the pope in his dominions, and to counteract his supremacy in the

hierarchy of the state. The effects of a similar spirit were manifested by the Venetian republic, the senate of which had, in the early part of this pope's reign, secularized a number of abbeys, and other rich establishments, and incorporated them with those belonging to the nobility. On account of these proceedings, the pope had threatened them with the effects of his apostolical anger, and even gone so far as to talk seriously of compelling them to obedience, by the force of temporal arms. This quarrel had at one time been appeased, by the intervention of certain cardinals, but the senate continued in its laudable labours of suppressing and reforming conventual houses in favour of hospitals and other charitable establishments, without paying any regard to the murmurs and complaints of the pontiff. The duke of Modena, likewise, without the concurrence of the holy see, suppressed the inquisition in his state, and was preparing, if it should appear necessary, to arm against the pope in defence of certain territorial rights. After all, these were the commencement of evils, and of no sort of consequence, compared with what Pius VI. was on the point of enduring from revolutionary France. In that country, before the assembling of the states-general, a disposition was shewn by many of the higher clergy to introduce reforms in matters of an ecclesiastical nature, without any application for the concurrence of the holy see. The French government, likewise, without communication with the court of Rome, had suppressed the order of the Celestines in France, and seized upon the estates of those of the same order, who, living under the Roman jurisdiction at Avignon, had property in the French territory. These circumstances filled the heart of Pius VI. with an overwhelming anxiety, which was augmented by the edict that was passed in favour of the Protestants, granting them a civil existence, and legitimating their children. Pius was urged by some of the members of the sacred college to adopt violent measures in defence of his dignity and just right; but he preferred moderate measures, and was contented to mourn in silence over these daring attacks upon his office, and that toleration of heretics which threatened ultimate ruin to the Catholic church.

In the following sketch we shall be as brief as possible, and endeavour to omit every circumstance that is not connected with the subject of the present article. The downfall, however, of the papal authority is of too great importance to the world to be lightly passed over: that power that tyrannised over the consciences and temporal rights of mankind for many centuries, so that to have lived to behold its humiliation and almost entire destruction, is no small privilege of the existing generation.

After the states-general in France had assembled in 1789, one of the first abuses which was the object of public attention, and which, it is believed, the court even had previously resolved to sacrifice, was the payment of ecclesiastical tribute to Rome, under the form of bulls, dispensations, and other objects of spiritual traffic. This was followed by a decree of the National Assembly, at the close of the year, declaring the church estates to be national property, which filled the court of Rome with general consternation. At length the pope's temporal possessions in Venaissin and Avignon were confiscated by the National Assembly. Against this seizure of his property, briefs and bulls were issued by the pope; and the partisans for his holiness, and the friends to the French revolution in the country which was the object of dispute, carried on against each other what was called a *civil*, but a bloody contest. At length the revolutionists of Avignon gained the ascendancy; and after dethroning the archbishop, and dispersing the clergy for refusing to

take the civic oath, they deposed the pope from his sovereignty, seized his revenues, and Avignon, with the whole of the papal territory in France, was converted into republican departments. When the National Assembly had formed their civil constitution for the clergy, the pope was solicited by the anti-constitutionalists, with the abbé Maury at their head, to suppress it by an apostolical bull. Accordingly he dispatched, with this view, his celebrated monitory of the 13th of April, 1791. But this instrument, so formidable in former times, now served no other purpose than to excite ridicule, increase the severity of the proceedings against the non-conforming clergy, and to excite popular odium against his holiness. In Paris it was regarded as the tocsin for a civil war, and the mob, without hesitation, to express their resentment against the power which issued it, burnt the effigy of the pope, in all his pontifical insignia, in the garden of the Palais Royal.

The hostility of the court of Rome to what was transacting in France was not confined to briefs and bulls, but was displayed in prosecutions against such persons as were suspected of any attachment to the revolution which had taken place. Several officers, natives of France, but in the pope's employ, were degraded, and sent to the galleys, for having discovered sentiments favourable to the new order of things. A kind of proscription, likewise, was begun against every thing or person which bore the name of French or Frenchman, till it was suspended in consequence of the interference of the executive council of the French republic, which threatened hostilities, if redress were not instantly obtained. After the appearance of the *famous* manifesto issued by the duke of Brunswick of the coalition of crowned heads, against the French republic, menacing with extermination all who should dare to resist the forces employed in maintaining the cause of royalty, military preparations were begun to be made in the papal dominions, which could not but be considered by the French government as intended to strengthen the power of their enemies. This suspicion was confirmed by the circumstances connected with, and immediately following the murder of Bassville, the French ambassador, by the mob of Rome. That minister had been sent, in 1793, to dissuade the pope from joining the league against the republic, and had been instructed to erase the royal arms from the French academy, and all public buildings belonging to the nation, and to substitute the republican insignia in their place. Pius, however, refused to acknowledge him as the representative of France, till a reparation had been made to the holy see for its wrongs. Bassville being prevented from displaying on the public buildings the emblems of his own government, determined to maintain its honour in his own personal appearance, and without hesitation openly paraded the streets with the national cockade in his hat. He had not worn it many days before he was assassinated in the streets. This deed was condemned in very gentle terms by the pope, who probably was not grieved at what had happened; instead, therefore, of making concessions, and endeavouring to discover and punish the perpetrators of the act, he openly declared against the French republic. His manifesto, which ordered a general armament, avowed the intention of assisting to exterminate the sworn enemies of all thrones and altars. The manifesto offered also amnesty and absolution to criminals who should take up arms for the church and state, and exempted no persons from the rising in arms but children, old men, and priests, "who were to raise up their hands on the mountain, while the faithful fought in the plain." The pope, for want of money, was unable to keep his army together, and in a very short time he was glad to change his tone, and to de-

clare himself neutral; he had not, however, wisdom and prudence sufficient to be steady in his neutrality. In 1796, when Bonaparte was every where victorious, Pius committed an act of aggression by suffering the Neapolitan cavalry who were hastening to their succour to pass through the territories of the church, and even directed their march. No sooner had the conqueror dispersed the Austrian armies in Italy, than he proceeded against those Italian states which had either joined or favoured them. Having with his main army entered the territory of the pope, and without resistance taken possession of Bologna, Ferrara, and Urbino, the pontiff was under the necessity of throwing himself on the clemency of the conqueror, who would not even grant him an armistice but on very severe conditions. By the terms of it, the pope was compelled to set at liberty those persons who were at that time confined for their political conduct or opinions, to renounce the friendship of the coalesced powers, and to shut up his ports against them; to surrender to the French the cities of which they already had possession, as well as the citadel of Ancona, to pay nearly a million sterling, and to deliver one hundred pictures, busts, vases, statues, &c. and five hundred manuscripts, to be selected by commissioners who should be sent to Rome for that purpose. When the terms of peace came to be discussed, the pope refused to accede to those conditions to which he had agreed when the armistice was concluded.

The court of Rome had now the temerity to resolve trying the fortune of its arms against those of France, having been promised the assistance of a considerable body of troops by the court of Vienna. Every effort was now made by the pope, but he was ill-seconded by his subjects, many of whom were more anxious to welcome the French to Rome than prevent their arrival. The crisis soon arrived which brought affairs to an issue, and exposed the fatal policy which had directed the determination of the papal cabinet. A series of ill success obliged his holiness to confirm all the conditions of the armistice without reserve; to admit the annexation of Avignon and Venaissin to the French republic; and he likewise consented to pay thirty millions of livres, as well as to furnish the French army with 16,000 horses, by way of ransom for the remnant of his dominions which he was permitted to retain. By this peace the political existence of the holy see was prolonged for a short time, but it was left in a state of extreme embarrassment: and the pope, who had already demanded of his subjects the half of their plate, was now obliged to call upon them for the remainder, requesting that it might be brought into the pontifical treasury within three days. This requisition produced much discontent and murmuring among the people, and strong symptoms of a revolutionary spirit were discoverable in all parts of the ecclesiastical state. The popular odium was particularly manifested against the duke of Braschi, on whom was lavished every expression of indignation and contempt. To check and restrain these tokens of public hatred and disaffection, the government of the court of Rome became severe and tyrannical. To overawe the people a strong garrison was placed in the castle of Angelo, and soldiers were distributed in different quarters of the city. These severities directed the public resentment against the pope, who could never appear abroad without receiving the strongest marks of disapprobation. Political conspiracies were every day forming, and in this distracted situation of affairs Joseph Bonaparte, the brother of the general, arrived at Rome in the quality of ambassador from the French republic. This was highly acceptable to those who were planning a change in the government, and towards the end of December 1797, an insurrection broke out, attended with very

disastrous circumstances, in consequence of which the French ambassador quitted Rome, and retired to Florence. In the commotion the French general Duphot had been most inhumanly murdered, of which the directory at Paris made a handle for seizing the remaining treasures of the ancient metropolis of the world, and for assuming the glory, if such it could be denominated, of erecting the Gallic standard on the Capitol. Orders were instantly given for the march of the French and Cisalpine forces to Rome. To deprecate, if possible, the wrath of the French government, and ward off the fatal blow, solicitations were made for the mediation of the Spanish ambassador, and that of the courts of Naples; Florence, and Vienna. The intervention of heaven was also sought by prayers, fastings, processions, and jubilees. The theatres were shut up; and new and numerous arrests of suspected persons were ordered to be made. In contempt of these acts of government, the revolutionary party covered the walls with satirical and menacing placards; and they also distributed among the people portraits of Bonaparte, with the title of the new saviour of the world. In the mean time the French and Cisalpine armies, under the command of general Berthier, marched to Rome, preceded by a proclamation, in which the general declared that the only object of his visit was the punishment of the murderers of Duphot and Bassville, and that the people of Rome should find in the French army protectors and friends. The revolutionary party, encouraged by this proclamation, actually proclaimed the Roman republic on the 15th of February 1798. Pius, however, resolved to make one more effort to preserve the government of the holy see from annihilation, and sent to Berthier, who was encamped without the walls of the city, his cardinal-vicar and other deputies, accompanied by the Neapolitan minister, who were instructed to negotiate for the continuance of his temporal existence, by the further sacrifices of provinces and of millions. His hopes were quickly dissipated by the peremptory refusal of the general to admit any other deputation than that of the Roman people. As the storm was approaching, some of the cardinals prudently fled from the city, but the majority waited the event, hoping, no doubt, to retain their rank and possessions, though probably at the expence of considerable sacrifices. For a short time they were treated with forbearance, but were obliged formally to abdicate their authority. After this, their estates were confiscated for the benefit of the nation, while the cardinals themselves were included under one common proscription, and confined as prisoners in a convent at Rome. From this prison they were sent to one, not so commodious, at Civita-Vecchia, where they were subjected to such menaces and insults, that the greater part of them were glad to purchase their liberty by the sacrifice of all their wealth. In the mean time the pope remained confined to his apartments at the Vatican, in anxious and trembling uncertainty with respect to his fate. That of his nephews, already mentioned, had been decided. The cardinal was a fellow sufferer with the other members of the sacred college, and the estates of the duke of Braschi were confiscated to the public use. His magnificent and sumptuous furniture, his pictures, engravings, antiquities, and his museum, were brought to the hammer. The estates and property of the pope himself were involved in the same confiscation with those of the cardinals: and the French commissaries, judging that his presence, in Rome, was incompatible with the tranquillity of the state, decreed that he should be sent beyond the boundaries of the Roman territory. Pius VI. was now escorted by a body of French cavalry to Sienna, where his first residence was in the convent of St. Barba, which he was obliged to quit by an earth-

quake that overthrew the apartments adjoining to those which he occupied, and damaged those in which he was. He now took up his abode within the walls of the city. In the month of May, he removed to a Carthusian convent within two miles of Florence. In this retired place Pius kept his little court, with great circumspection, to avoid giving umbrage either to the French or Tuscan government. He even offered to leave the nomination and regulation of his household to the inspection of the French minister. It was scarcely possible for papal humiliation to be carried much farther, for this minister happened to be a Protestant of the Lutheran persuasion. But stript of his pontifical dignity, Pius is said to have exhibited an excellent example of christian-like resignation. He ever expressed a meek and forgiving disposition towards those who had despoiled him of his power and authority. Unembarrassed by the cares of government, his health became more stable, his spirits increased, and adversity seemed to prove to him the true road to happiness. He was not, however, allowed to enjoy the blessings of this state of humble retirement; the French directory enjoined the grand duke to dismiss him from the Tuscan territory: and it was decided by the republican tyrants that he should be sent to the island of Sardinia, where a papal conspiracy, if such an event should happen, must necessarily be circumscribed within very narrow bounds, but the attack of serious illness made his removal impossible. After his health was restored, he was permitted to remain in peace in the Carthusian convent, till the renewal of the war between France and Austria which had been terminated by the peace of Campo Formio, when it was resolved that he should be removed into the interior of France. In the course of a long and painful journey, frequently exposed to the insults of the illiberal and unfeeling, who could not but exhibit signs of exultation in the destruction of the papal power, he caught a feverish disorder which put an end to his sufferings on the 29th of August, 1799, being in the 82d year of his age. The French directory refused to his remains the accustomed sepulchral rites, but upon a change in the government of that country, the consuls of the republic ordered that he should be buried, with the honours commonly due to a person of his rank, and that a simple monument should be erected over the place of his interment, with an inscription expressive of the dignity which he bore. In 1802 his successor, Pius VII., obtained permission to remove his body to Rome.

"Pius VI." says the excellent writer of his article in the General Biography, to whom we have very frequently referred in our own, "though possessed of many estimable qualities as a private man, had few of those talents which are necessary to govern in times of difficulty and danger. Yielding often to the impulse of the moment, the impetuosity of his character led him into some errors, which were followed by a speedy repentance. Presumptuous with respect to his own opinion he was blind to the future, where men of common sagacity had the clearest foresight; and filled with ideas of the importance and dignity of his office, he prepared for himself many mortifications and insults, which he had neither the address to avoid, nor the power to avenge. As the visible head of the church, his attention to the duties of his station was uniform and exemplary, and his piety, though ostentatious, was devoid of hypocrisy or fanaticism, and his morals were pure and irreproachable. In his youth he had been one of the handfomest men of his time. To a very lofty stature he joined a noble and expressive set of features, a benign countenance, a sonorous voice, and an elegant engaging manner. Of these advantages he was but too sensible, and he betrayed a puerile vanity in displaying them on all public occasions, which exposed him

to many bitter farcafms, and which the ferioufly devout were at a lofs to reconcile with the acknowledged fanctity and gravity of his character." See alfo New Ann. Register. Monthly and Gent. Mag.

We beg leave, in this place, to correct an error in the article LEWIS XVI., vol. xx., in which the daughter of that unfortunate monarch is mentioned as having died in 1796. She was, we are happy to fay, living, at that time, in London; pitied and refpected for her misfortunes, and honoured and beloved on account of her many virtues.

PIUZANO, in *Geography*, a town of Italy, in Friuli; 14 miles W. of Gemona.

PIX, in *Coinage*, a box, in which a fmall proportion or fample of the coins ftruck at the mint is referved, in order to be affayed and compared with a check-piece or fandard kept in the exchequer for the occafion. This operation, which is called the "trial of the pix," is performed with great exactnefs in the prefence of the privy council, the officers of the mint, and a jury of the goldfmiths' company; and there is no inftance upon record of the coins thus tried being found to vary from the full fandard.

PIXITES, in *Ancient Geography*, a river of Afia, in the Colchide, towards the north of the town called Trapezus.

PIZARRO, FRANCISCO, in *Biography*, the discoverer and conqueror of Peru, was the natural fon of a Spanifh gentleman by a woman of the loweft rank. His father, not thinking himfelf bound to raife him to a condition fuperior to his maternal birth, not only left him deftitute of all education, but employed him in the fervile office of keeping fwine. Indignant at this treatment, he ran away and enlisted as a common foldier. After ferving fome time in Italy, he joined the adventurers who were embarkng at Seville for America. He was prefent in all the wars of Cuba and Hifpaniola, and upon every occafion he flood pre-eminent for undaunted courage, perfeverance, and enterprize, and was in a fhort time confidered as fully qualified for command. His mind and body were equally adapted for difficult and laborious undertakings, and experience had prepared him to meet all emergencies. In 1524, having acquired fome property, he, with Diego de Almagro, and Hernando Luque, entered into an affociation for the conqueft of the fupposed rich countries on the coaft of the South fea. Pizarro made the firft attempt. He failed in November from Panama in a fingle vefel with 112 men, fo feeble were the means by which the fubverfion of a great empire was to be effected. (See PERU.) Pizarro made feveral voyages, and with his affociates acquired the moft important conquefts, till at length the conquerors quarrelled among themfelves, and in April, 1538, the two hostile parties of Spaniards, each bearing the royal fandard, met and engaged with all the fury of inveterate foes, while an immense multitude of Indians, who had borne the cruelties of both, affembled on the furrrounding mountains, enjoying, to them, the edifying fpectacle of their favage foes deftroying each other by mutual flaughter. The battle was fatal to the caufe of Almagro, who was himfelf taken prifoner after the total and bloody defeat of his troops. In a very fhort time the mercilefs Pizarro brought his old affociate to trial, condemned and executed him. Afterwards Pizarro was the unrivalled mafter of thefe extenfive regions, and without any regard to the Spanifh court, he divided them like a conqueror among his followers, fetting apart the moft valuable lots for himfelf, his brothers, and favourites. His partiality excited much difcontent among perfons, all of whom were actuated by the thirft of gain. The partizans of Almagro fighed in fecret for revenge; but as no open hostility was manifefted, the plan of difcovery was carried on with vigour, and Gonzalo

Pizarro was difpatched by his brother upon the arduous enterprize of croffing the Andes, and exploring the countries to the eaft of that chain. It was on his return to Quito that he learnt the deftruction of his brother. The followers of Almagro had repaired in great numbers to Lima, where the fon of their late chief received them with much kindnefs, and engaged their warmeft attachment by his popular qualities. In their private meetings a confpiracy was formed againft the life of Pizarro. He was apprized of the fact, but, in the confidence of uncontrolled power, he difregarded them. The plot was, however, matured; and on the 26th of June 1541, at mid-day, a time, in thofe hot climates, devoted to refofe, Herroada, one of the principal of the Almagrian officers, at the head of eighteen determined affociates, fallied out armed from Almagro's houfe, and proceeded to the palace. They paffed unobferved through the outer courts, and were arrived at the foot of the ftaircafe before an alarm was given. Pizarro was in a large hall with fome friends. One of thefe who came to the top of the ftairs to enquire into the caufe of the tumult, was laid dead, while others efaped through the windows. The confpirators rufhed into the hall; Pizarro, with his half brother Alcantara, was killed, and the others mortally wounded: the former defended himfelf till he was abfolutely exhausted with fatigue, when, unable any longer to parry off the weapons, he received a thruft full in the throat, fell, and expired. His memory lives and ever will live as a fignal contributor to his country's aggrandizement, but blaekened with the ftain of atrocious cruelty and perfidy. Univer. Hift. Robertfon's America.

PIZOLO, in *Geography*, a town of Sicily, in the valley of Noto; eight miles S. of Modica.

PIZZATI, GIUSEPPE, in *Biography*, published at Venice in folio, with a feparate volume of plates, in 1782, a treatife "On the Science of Sounds and of Harmony:" "La Scienza de' Suoni, e dell' Armonia." The author clearly explains the phenomena of found, as far as concerns practical mufic, from d'Alembert, another modern writer on harmonics, and gives an account of late difcoveries in the fcience, and of the fyftems of Rameau and Tartini, from Rouffeau, explaining the laws of harmony in their prefent ufe.

PIZZICATO, in *Italian Mufic*, from *pizzicure*, to pinch, is a term that announces to the performers on bowed inftruments the ufe of the fingers inftead of the bow. When the bow is to be refumed, it is expreffed by the words *con arco*.

PIZZIGHITONE, in *Geography*, a town of Italy, in the department of the Upper Po, on the Adda; nine miles N.W. of Cremona. N. lat. 45° 10'. E. long. 9° 48'.

PIZZO, a town of Naples, in Calabria Ultra, near the coaft; 13 miles N.E. of Tropea.

Pizzo Ferrato, a town of Naples, in Abruzzo Citra; 13 miles E.S.E. of Sulmona.

Pizzo di Gotto, a town of Sicily, in the valley of Demona; fix miles S. of Melazzo.

PLA, a town of Spain, in the province of Catalonia; five miles S. of Urgel.

PLABENNEC, a town of France, in the department of the Finifterre, and chief place of a canton, in the diftrict of Brest; feven miles N.E. of Brest. The place contains 3255, and the canton 11,833 inhabitants, on a territory of 230 kilometres, in 12 communes.

PLACAGNODIAUGIA, in *Natural Hiftory*, the name of a genus of fpars.

The word is derived from the Greek *πλαζζ*, a *cruff*, *αργος*, *pure*, and *διωγνις*, *pellucid*.

The bodies of this genus are cryftalline terrene fpars, or fparry bodies with much of the brightnefs and tranfparence

of crystal, but debased by an admixture of earthy matter, and are imperfectly pellucid, and formed into thin plates with flat surfaces, but covered at times, either in part or entirely, with tubercles or botryoid prominences, and are composed of arrangements of oblong concretions, of no determinately angular figure.

Of this genus there are only two known species, *viz.* a hard semipellucid and yellowish-brown one, and a brittle pellucid and whitish one. Hill.

PLACAGNOSCIERIA, the name of a genus of spars.

The word is derived from the Greek *πλαζ*, a *crust*, *αγνος*, *pure*, and *οκνησις*, *opaque*.

The bodies of this genus are dull and opaque crystalline terrene spars, formed into crusts, and of an irregular and not striated texture within.

Of this genus there are three known species, *viz.* a hard whitish-brown one, a dull crumbly whitish one, and a dull pale brown friable one, of a very coarse texture, which encrusts the sides and bottoms of vessels, in which water is frequently boiled. Hill.

PLACANICA, in *Geography*, a town of Naples, in Calabria Ultra; 27 miles E.S.E. of Reggio.

PLACARD, or PLACART, *Placaert*, a foreign term, frequent in gazettes, signifying a leaf, or sheet of paper, stretched and applied upon a wall, or post. Edicts, regulations, &c. are to be made public in placards.

The word placard is also used for a libel or lampoon. At Rome, placards against the pope are frequently fixed, in the night-time, to the statue of Pasquin. See PASQUINADE.

PLACARD, in *Architecture*, denotes the decoration of the door of an apartment, which is sometimes a cornice supported by consoles.

PLACARD, in our *Customs*, denotes a licence whereby a person is permitted to shoot with a gun, or to take otherwise unlawful game.

PLACCIUS, VINCENT, in *Biography*, a learned jurist, was born at Hamburg in the year 1642. After studying at Leipzig, and other places, he travelled into Italy and France, and became a licentiate in law at Orleans. Returning to his native city, he practised at the bar; and in 1675, was appointed professor of moral philosophy and eloquence, the duties of which he performed till his death, in 1699. He was author of a volume of Latin poems, and of many other works, of which the principal are, 1. A curious bibliographical piece concerning anonymous writers, first published at Hamburg in 1674, under the title of "De Scriptis et Scriptoribus anonymis atque pseudonymis Syntagma;" together with the "Catalogus Auctorum suppositorum" of Rhodias. The work was well received, and he prepared a new edition of it, with considerable additions, which was printed after his death, in 2 vols. folio, in 1708, under the care of John Albert Fabricius. A supplement to it was published by Mylius, in 1740, at Hamburg. 2. "De Arte Excerptendi," 1689. Placcius has always been esteemed a learned and able writer, but his style is said to be obscure, and occasionally confused. Moreri.

PLACE, PETER DE LA, a learned French magistrate, and various writer, was born at Angoulême in the year 1526. He applied with success to the study of jurisprudence, and in 1548 published a Latin paraphrase on the Titles of the Imperial Institutes, "De Actionibus, Exceptionibus et Interdictis," in 4to. After this he was called to the bar of the parliament of Paris, and pleaded with so great success, that he acquired the character of a learned, eloquent, and virtuous counsellor. Francis I. ap-

pointed him advocate of his court of aids at Paris, and he discharged the duties of that office with so much talent and integrity, that Henry II. nominated him his first president in the same court. It was believed that he was a convert to the Protestant religion in the year 1554, but he did not make an open profession of it till the death of Francis II. On the breaking out of the civil war, he retired to one of his houses in Picardy; but upon the conclusion of peace in 1562, he seized the earliest opportunity of vindicating himself before the king from the several charges which had been preferred against him. He was now appointed by the prince of Condé superintendent of the household; and upon the rupture of that prince with the court, about the year 1566, M. La Place retired to the castle of Vè in the Valois, where he continued after the death of the prince, till Charles IX. granted the Protestants advantageous terms of peace in 1569, with the design of the more easily extirpating them. La Place, deceived by royal treachery, returned to Paris, and resumed the office of president to the court of aids, which he retained till he fell a victim in the horrible and accursed massacre of the Protestants, on St. Bartholomew's day, in the year 1572, at the age of 46. He is said to have possessed great soundness of judgment, clearness of discrimination, and a truly philosophic spirit, which admirably qualified him for the office of magistrate, and which were seldom found united in the professional men of that time. His chief works are, "Commentaries on the State of Religion, and of the Commonwealth, from 1556 to 1561;" "A Treatise on the right Use of Moral Philosophy in connection with the Christian Doctrine;" and "A Treatise on the Excellence of the Christian Man." Moreri.

PLACE, *Locus*, in *Philosophy*, that part of immoveable space which any body possesses.

Aristotle, and his followers, divide place into *external* and *internal*.

PLACE, *Internal*, is that space, or room, which the body contains.

PLACE, *External*, is that which includes or contains the body; which is also called, by Aristotle, the first or concave and immoveable surface of the ambient body.

It is controverted, in the schools, whether internal place be a real entity, or only an imaginary being; *i. e.* whether it be any thing intrinsically, or only an aptitude and capacity of receiving bodies.

Some maintain it a positive being, incorporeal, eternal, independent, and infinite; and assert it even to constitute the immensity of the godhead.

The Cartesian, on the contrary, hold internal place, abstractedly considered, to be no other than the very extension of the bodies contained in it; and therefore in no wise different from the bodies themselves.

The schoolmen likewise dispute, whether external place be moveable, or immoveable? Its immobility is argued from this consideration; that what moves, must necessarily leave its place; which it cannot do, if it go along with the moveable. Others charge an absurdity on this opinion of Aristotle; *viz.* that hence it follows, that a body really at rest is continually shifting place: a tower, for instance, on a plain; or a rock in the middle of the sea; because the one and the other, continually inclosed with new air, or new water, must be said to be in motion or to change place.

To solve this difficulty, and ward off the absurdity which follows from Aristotle's laying down external place as immoveable, many expedients have been had recourse to. The Scotists contend for place's being only immoveable, by equivalence. Thus, when the wind blows, the air which in-

vested the surface of the tower does indeed recede, but then other similar and equivalent air takes place. The Thomists choose to deduce the immobility of external place, from its keeping the same distance from the centre, and the cardinal points of the world; and the Nominalists, from a correspondence with certain virtual parts of the divine immensity.

The Cartesians deny external place to be either a surrounding surface, or a body surrounded, or a mean term between the two; and conceive it to be the situation of a body among adjacent bodies considered as at rest. Thus the tower shall be deemed to remain in the same place, though the ambient air be changed; since it retains the same situation with regard to the neighbouring hills, trees, and other parts of the earth.

Sir Isaac Newton better, and more intelligibly, distinguishes place into *absolute*, and *relative*.

PLACE, *Absolute*, and *primary*, is that part of infinite and immovable space which a body possesses.

PLACE, *Relative*, or *secondary*, is the space it possesses, considered with regard to other adjacent objects.

Dr. Clarke adds another kind of relative place, which he calls *relatively common* place; and defines it, that part of any moveable or measurable space which a body possesses; which place moves together with the body.

PLACE, Mr. Locke observes, is sometimes likewise taken for that portion of infinite space possessed by the material world, though this, he adds, were more properly called extension.

The proper idea of place, according to him, is the relative position of any thing, with regard to its distance from certain fixed points; whence we say, a thing has or has not changed place; when its distance is, or is not altered with respect to those bodies.

For the vision of place, see VISION, and VISIBLE.

PLACE, in *Optics*, or *Optical Place*, is the point to which the eye refers an object.

Thus the points D and E (*Plate XVII. Optics, fig. 11.*) to which two spectators in *d* and *e* refer the object C, are called *optic places*.

Here, if a right line joining the optic places D and E, be parallel to a right line passing through the eyes of the spectators *d, e*; the distance of the optic places D, E, will be to the distance of the spectators *d* and *e*, as the distance of one of the optic places from the place of the object E C, to the distance of the other spectator from the same object *d C*.

PLACE, *Optic*, of a star, is a point in the surface of the mundane sphere, as C or B (*Plate XVIII. Astronomy, fig. 4.*), wherein a spectator in E, or T, sees the centre of the star S.

This is divided into *true* and *apparent*.

PLACE, *True*, or *real optic*, is that point of the surface of the sphere B, in which a spectator, placed in the centre of the earth, sees the centre of the star, or phenomenon. Or, it is a point among the fixed stars, determined by a line drawn from the centre of the earth through that of the star, and terminated in B among the stars.

PLACE, *Apparent*, or *visible optic*, is that point of the surface of the sphere, in which a spectator, placed on the surface of the earth in E, sees the centre of the star S. Or, a point C found by a line passing from the spectator's eye through the star, and terminated in the sphere of the stars.

The distance between the two optic places makes what we call the *parallax*.

The *apparent* place, in optics, is different from the *real* one; for when, by refraction through glasses, that parcel of rays which falls on the pupil of the eye, from each point

of any near object, is made to flow as close together, as that which comes from a distant one; or when, by the same means, the rays coming from distant objects are made to diverge as much as if they flowed from near ones; then the eye must necessarily see the place of the object changed; which change is its apparent place.

If an object be placed nearer to a convex glass than is the distance of its focus, its apparent place may be determined; but if the object be in the focus of the glass the *locus apparentis* of the object cannot be determined; only that it will appear vastly remote.

Nor can the *locus apparentis* be determined if the object be beyond the focus of the convex glass; but if the object be farther distant from a convex glass than its focus, and the eye lie beyond the distinct base, its apparent place will be in the distinct base. See LENS.

PLACE of the sun, a star, or planet, simply, denotes the sign and degree of the zodiac, which the luminary is in.

Or, it is that degree of the ecliptic, reckoned from the beginning of Aries, which the planet's or star's circle of longitude cuts; and therefore it coincides with the longitude of the sun, planet, or star.

As the sine of the sun's greatest declination  $23^{\circ} 30'$ : to the sine of any present declination given or observed, *v. gr.*  $23^{\circ} 15'$ : so is radius 10: to the sine of his longitude  $80^{\circ} 52'$ , which, if the inclination were north, would give  $20^{\circ} 51'$  of Gemini, if south,  $20^{\circ} 52'$  of Capricorn, for the sun's place.

PLACE, *Astronomical*. See ASTRONOMICAL.

PLACE, *Moon's*, is that point of her orbit in which she is found at any time.

This, by reason of the great inequalities in the lunar motions, which render a number of equations and reductions necessary before the just point be found, is of various kinds.

PLACE, *Excentric*, of a planet in its orbit. See EXCENTRIC, and P, *Plate XVI. Astron. fig. 148.*

PLACE, *Heliocentric*, of a planet. See HELIOCENTRIC, and R, *fig. 148.*

PLACE, *Geocentric*. See GEOCENTRIC, and R, *fig. 148.*

PLACE of Radiation, in *Optics*, is the interval, or space in a medium or transparent body, through which any visible object radiates.

PLACE, in *Geometry*, is a line used in the solution of problems; more usually called by the Latin name *locus*.

See the doctrine of geometrical places under LOCUS.

PLACE, in *War*, is a general name for all kinds of fortresses, where a party may defend themselves.

In which sense it may be defined to be a place so disposed, as that the parts which encompass it defend and flank one another.

PLACE, *Strong*, or *fortified*, is a place flanked and covered with bastions. See FORTIFIED PLACE.

PLACE, *Regular*, is that whose angles, sides, bastions, and other parts are equal; and this is usually denominated from the number of its angles: as a pentagon, a hexagon, &c. Palma Nova, built by the Venetians, is a dodecagon.

PLACE, *Irregular*, is that whose sides and angles are unequal.

PLACE of Arms, in *Fortification*, is a strong city or town, pitched upon for the chief magazine of an army.

PLACE of Arms, in a city or garrison, is a large open spot of ground, usually near the centre of the place, where the grand guard is commonly kept, and the garrison holds its rendezvous at reviews, and in cases of alarm, to receive orders from the governor.

PLACE of Arms, of an attack, in a siege, is a spacious place covered from the enemy by a parapet or epaulement, where

where the soldiers are posted ready to sustain those at work in the trenches, against the soldiers of the garrison. It is customary to make three places of arms, when the ground will permit; the first and most distant from the place is about three hundred toises from the glacis of the covert way; the second is within one hundred and forty toises; and the third at the foot of the glacis. See PARALLELS.

*PLACE of Arms particular*, in a garrison, is a place near every bastion, where the soldiers, sent from the grand place to the quarters assigned them, relieve those that are either upon the guard, or in fight.

*PLACE of Arms without*, is a place allowed to the covert-way, for the planting of cannon; to oblige those who advance in the approaches to retire.

Those places of arms that are in the covered way, are places made at the entering and salient angles, considerably larger than the street of the covered way, and formed by turning the head of the glacis into two faces, projecting towards the country: those at the salient angles are formed by the rounding of the counterescarp; those at the entering angles are constructed by taking the gorges at the head of the glacis of a certain length, drawing the faces at a certain angle, and parallel to those faces drawing a glacis.

*PLACE of Arms*, in a camp, is properly the bell-tents at the head of each company, where the arms are lodged. It also denotes a large space at the head of the camp, for the army to be ranged in and drawn up in battalia.

*PLACE of Arms of a troop or company*, is the spot of ground on which the troop, or company, draws up.

*PLACE, Face of a.* See FACE.

*PLACE, Tenaille of the.* See TENAILLE.

*PLACE, View of a.* See VIEW.

*PLACE, Fire.* See FIRE-PLACES.

*PLACE*, among logicians and orators, denotes the seat or source of an argument; or that from which it is taken.

*PLACE* is used in the doctrine of artificial memory: and these places may be either such in a proper sense, as a door, a window, a corner, &c. or familiar and known persons; or any thing at pleasure, provided that they be placed in a certain order, animals, plants, words, letters, characters, historical personages, &c. though some of these are more and some less fit for the purpose; but such kinds of places greatly help the memory, and raise it far above its natural power. See MEMORY and MNEMONICS.

*PLACE, Common.* See COMMON PLACE.

*PLACE of Units, Tens, &c.* See UNIT and NUMERATION.

*PLACES, Hylegial, in Astrology.* See HYLEGIAL.

*PLACE, Whispering.* See WHISPERING.

*PLACE, Additions of.* See ADDITION.

*PLACE, Unity of.* See UNITY.

*PLACE Bricks*, were kiln-burnt red bricks of a full size, now entirely disused in the metropolis; but in lieu of them, the soft insufficiently burnt bricks from the outside of the clamps are called, by way of distinction from stock or hard burnt bricks, place bricks. These are of a foul red colour, and will easily break or crush to pieces. The particular manner in which place bricks were formerly made was by dipping the mould in water before the clay was put in; which made the outer surfaces when burnt very coarse and hard. See BRICK.

*PLACENTA*, in *Anatomy*, a vascular spongy body, containing the ramifications of vessels from the uterus, and of others from the foetus, and forming the medium by which the mother and child are connected. See GENERATION.

*PLACENTA*, in *Natural History*, the name of one of the classes of the echini marini. The characters of these are,

that they are of a depressed or flatted form, and are wrought in various shapes, as the pastry people make their cakes; they all have a cinquefoil flower at their top, and their mouth is in the middle of the base; the aperture for their anus is usually near the edge.

Of this class there are three genera: 1. The melitta. 2. The laganum. And 3. The rotula: which see under their several heads.

*PLACENTA*, among the *Ancients*, a kind of cheese-cake, the most simple kind of which was made of flour mixed with oil and cheese, to which honey was added: but the more luxurious sort of people added likewise a great variety of luxurians and fruits, as also sugar, eggs, butter, &c.

*PLACENTIA*, or *PIACENZA*, in *Geography*, a city of Italy, and capital of a duchy annexed to Parma, on the S. side of the Po. This city was built and colonized by the Romans about 218 years B.C., and not long after, served as an asylum to the Roman army, when defeated by Hamibal at the Trebia. It was afterwards assaulted by that Carthaginian general, without success. This city became very flourishing and municipal, but it suffered much in the troubles that attended the elevation of Otho to the empire; and when attacked by a party of the Vitellians, it effectually resisted, and in the bloody contest had only to lament the loss of its amphitheatre, remarkable for its capaciousness and architecture, which was set on fire and reduced to ashes. Placentia, after having frequently changed masters, was annexed to Parma, and thus remained till the expulsion of the late duke, when, with the whole of its territory, it was occupied by the French. It is a large and well built city. Its cathedral is Saxon; the town-house, with some other public buildings in the great square, Gothic. Several churches, particularly that of St. Agostino, are of fine Roman architecture, and some of them adorned with paintings of great celebrity. The great square is ornamented with two brassesquestrian statues, one of Alexander Farnese, and the other of his brother Ranuccio, which are much admired, particularly the former, for attitude, animation, and drapery. The streets of Placentia are handsome, broad, and straight: one in particular, called the Stradone, is reckoned the longest and most beautiful in Italy, being 3000 feet in length. Placentia is a bishop's see, and contains, besides the cathedral, 1 collegiate, 12 parochial, and 38 other churches, 8 abbies, 16 convents, and an university. The number of inhabitants is about 20,000, including 2000 ecclesiastics. The neighbourhood of Placentia is, perhaps, more interesting than the town itself, as it was the theatre of many bloody engagements. The duchy is about thirty miles long from N. to S., and from 8 to 15 broad from E. to W.; the soil is fertile, and furnishes mines of iron, copper, and vitriol; 52 miles S.E. of Milan. N. lat. 45° 3'. E. long. 0° 43'.

*PLACENTIA Bay*, a spacious bay on the S. coast of Newfoundland, which forms a good harbour for ships, and is frequented by ships employed in the cod-fishery, and by those that are bound into the gulf or river St. Lawrence. It opens between Chapeau Rouge Point W. and cape St. Mary's on the E., 15½ leagues apart; lying between N. lat. 46° 43' 30" and 47° 54', and between W. long. 54 1' and 55 21' 30". The post-town, which gives name to the bay, is on the eastern shore; 67 leagues to the E. of the island of Cape Breton, 40 miles W. by S. of St. John's, in N. lat. 47° 15' and W. long. 55 13'. The harbour is so capacious, that 150 sail of ships may lie in security, and fish as quietly as in any river. The entrance into it is by a narrow channel, which will admit but one ship at a time. Sixty sail of ships can conveniently dry their fish on the Great Strand, which lies between two steep hills, and is about three miles long.

long. One of the hills is separated from the strand by a small brook, which runs out of the channel, and forms a fort of lake, called the Little Bay, in which are caught great quantities of salmon. The inhabitants dry their fish on what is called Little Strand. The French had formerly a fort called St. Louis, situated on a ridge of dangerous rocks, which contracts the entrance into the harbour. In going in the ridge must be left on the starboard.

PLACENTIA *Lagoon*, a bay on the coast of Yucatan. N. lat.  $18^{\circ} 38'$ . W. long.  $89^{\circ} 40'$ .

PLACENTIA *Island*, an island near the coast of Maine. N. lat.  $44^{\circ} 10'$ . W. long.  $68^{\circ} 10'$ .

PLACER *de Abraxas*, a rocky islet, near the S. coast of Cuba. N. lat.  $21^{\circ} 18'$ . W. long.  $80^{\circ} 52'$ .

PLACETTE, JOHN DE LA, in *Biography*, an eminent French minister and moralist, was born at Pontac, in Bearn, in the year 1639. He received the early part of his education under his father, who was minister of his native place; and after he had made good proficiency in the classics and the belles-lettres, he applied to the studies requisite to qualify him for the profession of a divine. His first settlement was with the church of Orthès in Bearn; from which he removed, in about four years, to that of Nay, in the same province. Here he continued till the year 1685, when the revocation of the edict of Nantes compelled him to renounce his country for an asylum among strangers. He now gladly accepted an offer made him by the queen of Denmark, to become pastor of a French church, which she had founded at Copenhagen. He enjoyed the favour and patronage of that illustrious princess till her death, in 1711, when he removed into Holland. Here he first resided at the Hague, and afterwards at Utrecht, where he died in 1718, in the 80th year of his age. His works are very numerous, of which some of the chief are as follow: "New Moral Essays," in 6 vols. 12mo.; "A Treatise on Conscience," which was translated into English by Basil Kennet, under the title of "The Christian Casuist;" "A Treatise on Oaths;" "A Treatise on the Games of Chance;" and "A Compendium of Christian Morality," of which the best edition is said to be that of 1701. The character of this writer is thus drawn: "His knowledge was extensive, his penetration lively, and his judgment calm and dispassionate. His disposition was benevolent, his manners affable, and his charity was extended to Christians of all communions. With great clearness of perception, and soundness of judgment, he has very happily disentangled and elucidated the most intricate and embarrassed questions. Less profound than Nicole, and less ingenious than Rochefaucault, he will please good men by his solid morality, equally removed from excessive rigour and criminal remissness." His style, as a writer, is simple and equable, though frequently diffuse. Moreri.

PLACIA, in *Ancient Geography*, a town of Asia Minor, in Mysia, on the borders of the Propontide, between Pannormus to the W., and the mouth of the Rhyndacus to the E. According to Pomponius Mela, and also Herodotus, this town was colonized by the Pelasgi. Cybele was held in great veneration in this place, and as Cyzicus was very near it, the Cyzicanians worshipped her under the name of the "Mother Placia."

PLACIDE, in *Biography*, a French monk, celebrated as an able geographer, was, probably, born at Paris in the year 1648. He was nearly related to, and pupil of, Peter Duval; and, at the age of 18, embraced the religious life in the convent of the Augustinian bare-footed friars, at the Place des Victoires. Here he appears to have made geography the principal pursuit of his life, and drew several

maps and charts that were highly esteemed, of which the most celebrated is that of "The Course of the River Po," consisting of several sheets. On account of his great skill and ingenuity in this branch of science, he was, in 1705, appointed geographer in ordinary to the king. He died in 1734, at the advanced age of 86. An engraved likeness of this able man is sometimes to be met with as a frontispiece to collections of his maps. But the monks of his fraternity obtained possession of the plate, and destroyed it, out of resentment to Placide, who refused to submit to their newly adopted fashion of being shaved; and he is represented in the engraving as wearing a beard. Moreri.

PLACIDIA, a Roman empress, the daughter of Theodosius the Great, by his second wife Galla. She was born about A.D. 388, and was brought up in the palace of Constantinople. When her brother Honorius was seated upon the throne of the western empire, she took up her residence in Rome, and was in that capital when it was invested by Alaric in 408. At the third siege and sack of Rome in 410, Placidia was one of the captives whom the conqueror carried away with him; she was, however, treated with the respect due to her rank and sex. After the death of Alaric, Ataulphus, who succeeded him as king of the Goths, refused to restore her, and at length made proposals of marriage to her. She submitted, says Gibbon, without reluctance to the desires of the conqueror, a young and valiant prince, who yielded to Alaric in loftiness of stature, but who excelled him in the more attractive qualities of grace and beauty. The marriage of Ataulphus and Placidia was consummated before the Goths retired from Italy. The bride, attired and adorned like a Roman empress, was placed on a throne of state, and the king of the Goths, who assumed on this occasion the Roman habit, contented himself with a less honourable seat by her side. The nuptial gift, which, according to the custom of the nation, was offered to Placidia, consisted of the rare and magnificent spoils of her country. Fifty beautiful youths, in silken robes, carried a basin in each hand, and one of these basins was filled with pieces of gold, the others with precious stones of inestimable value. These, however, formed an inconsiderable portion of the Gothic treasures. She brought forth a son, who soon died, and shortly after, in 415, Ataulphus was murdered by one of his domestics in Spain. Singeric, who usurped the Gothic throne, treated Placidia with great ignominy, and obliged her to walk twelve miles before his chariot with a crowd of other captives; but Singeric was assassinated a few days after his elevation. By a treaty between the Romans and Goths, she was afterwards ransomed at an immense price, and returned to Italy. In 417, her brother Honorius, as a reward for the services of his general Constantius, compelled her to give him her hand in marriage. She manifested great reluctance to this union, which, nevertheless, was productive of a son and daughter, named Valentinian and Honoria. Placidia again became a widow in 421, after her husband had occupied the throne only seven months. After this Placidia fought for herself and children a retreat at Constantinople, where she was honourably received by her nephew Theodosius, who granted to Placidia the title of Augusta, and to her son that of Cæsar. In 425, Placidia again recovered her authority, and assumed the reins of government, as regent, during the minority of her son. Her administration was not remarkable for wisdom or vigour, and she has been charged with the despicable and criminal policy of corrupting her son by a dissolute education, that she might the longer keep the power in her own hands. At any rate, she seems to have governed with absolute sway till her death, at

at the age of 62, in the year 450. She was interred at Ravenna, where her tomb, and even her corpse seated in a cypress chair, were preserved for many ages. This empress received many compliments from the orthodox clergy, and St. Peter Chrysologus assured her, that her zeal for the Trinity had been recompensed by an august trinity of children. Univer. Hist. Gibbon, vols. v. and vi.

**PLACITA**, **PLEAS**, a term frequent in our laws and customs. Originally, placita signified certain public assemblies of all degrees of men, in which the king presided, and where the great affairs of the kingdom were consulted upon.

These assemblies were called *placita generalia*; because *generalitas unversorum majorum tam clericorum quam laicorum ibidem conveniebat*. And hence the decrees, ordinances, sentences, &c. of this assembly, were also called *placita*.

Sim. Dunelmensis tells us, they were held in the open fields; for, says he, *nullam oportet regem in literis assignare curiam, quia ubi rex judicat in aperto ibi est curia sua*.

Some will have these *placita generalia*, and *curia regis*, of ancient times, to be much the same with what we now call a *parliament*.

The lords courts came hence also to be called *placita generalia*, though oftener *curia generalis*; because all their tenants and vassals were obliged to appear in them.

We also meet with *placitum nominatum*, for the day appointed a criminal to appear in, and make his defence. Leg. Hen. I. And *placitum fractum*, i. e. when the day is lapsed.

Lord Coke derives the word *placitum* à *placendo*, quia *beneficentare super omnia placet*: indeed, this seems a very fanciful etymon; and others have more reason in deriving the word from the German *platz*, or the Latin *plateis*, *fields*, or *streets*, where these assemblies were originally held.

**PLACITARE**, in the old *Law Books*, signifies to plead causes. See **PLEADING**.

“Mos placitandi, ante Conquestum, fuit coram aldermanno, et proceribus, et eorum hundredariis, sc. baronibus, majoribus, melioribus, senioribus, et urbanis.” Misc. in Bibl. Cott. sub. tit. Vitellius.

Hence, *placitator*, a *pleader*. Ralph Flambard is recorded to have been *totius regni placitator*, in William II.'s time.

**PLACITUM**, in *Law*, a sentence of the court; or an opinion, ordinance, or decree.

*Custos PLACITORUM coronæ*. See **CUSTOS**.

**PLACKET**, or **PLAQUETTE**, in *Commerce*, a small silver coin of the Netherlands, of  $3\frac{1}{2}$  stivers current. The old plaquettes have been reduced to  $2\frac{1}{2}$  stivers. The assay of the placket is W. (worse than the English standard) 5 oz. 8 dwt.; its weight, 1 dwt. 18 gr.; its contents in pure silver grains, 20; and its value in sterling,  $\text{or. } 2\frac{3}{4}d$ .

**PLACODIUM**, in *Botany*, from *πλακωδης*, *broad and crustaceous*, a division of the natural order of *Lichenes*, as first distributed by Hoffmann, and constituting the fourth section of his seventh genus, *Lobaria*. It composes the second tribe in the *Prodromus* of Acharius, but has no part in the subsequent arrangement, published in his *Methodus*. See **LICHENES**.

**PLACUS**, from *πλακω*, *a cake*, because the inhabitants of CochinChina use the fragrant juice of the genus in quession, as an ingredient in cakes.—Lour. Cochinch. 496.—Class and order, *Syngenesia Pelygamia-superflua*. Nat. Ord. *Compositæ nucamentaceæ*, Linn. *Corymbifera*, Juss.

Gen. Ch. Common calyx imbricated, inversely turbinate,

scales linear, slender, erect. *Cor.* compound, equal to the calyx, erect; *florets* of the disk few, all perfect, tubular, five-cleft; those of the circumference very numerous, naked. *Stam.* (in the perfect florets) Filaments five, very short; anthers forming a cylindrical tube. *Pist.* (in all the florets) Germen oblong; style thread-shaped, short; stigmas two, oblong, erect in the perfect florets, reflexed in the female ones. *Peric.* none, except the unchanged calyx. *Seed* to each of the florets oblong, most slender in the female ones; down capillary. *Recept.* naked, convex.

Eff. Ch. Receptacle naked. Down capillary. Calyx imbricated, inversely turbinate, with linear scales. Florets of the radius without a corolla.

1. *P. tonentesus*. Lour. n. 1.—Leaves ovate, obtuse, downy on both sides. Found wild, as well as cultivated, in CochinChina. *Stem* herbaceous, two foot high, erect, branched. *Leaves* alternate, sessile, ferrated, odoriferous. *Flowers* violet, in terminal, erect, oblong panicles.

2. *P. levis*. Lour. n. 2.—Leaves ovate, pointed, smooth. Native of the same country.—*Stem* not quite so tall, smooth. *Flowers* pale yellow, in short terminal panicles. *Calyx* tumid at the base. We know nothing of these plants but from the account of Loureiro. See **ELICHRYSUM**, **GNA-PHALIUM**, and **ERIGERON**.

**PLADAROTIS**, from *πλακωδης*, *fluid*, in *Surgery*, a fungous tubercle upon the inside of the eye-lid.

**PLADIA**, or **BLADIA**, in *Geography*, a town of Prussia, in the province of Natangen; 22 miles S.W. of Konigsberg.

**PLADLING**, a town of Bavaria, situated on the Iser; 8 miles N.W. of Otterhofen.

**PLAFOND**, or **PLATFOND**, in *Architecture*, the ceiling of a room, whether it be flat or arched; lined with laths and plaster, and sometimes also enriched with paintings, &c. See **CEILING**.

**PLAFOND** is also more particularly used for the bottom of the projecture of the larnier of the cornice; called also the *soffit*.

**PLAGALIS**, Lat. *πλαγίος*, *obliquus*, à *latere*. Plagal and authentic, in the ecclesiastical modes, or canto fermo, imply the different divisions of the octave: the division is called *authentic*, when the 5th is in the acute; and *plagal*, when the 4th is in the grave. See **PLAIN CHANT**, and **MODES**, *Ecclesiastical*.) The terms *authentic* and *plagal* are with reason censured by Meibomius and Bontempi as barbarous. Bontempi proposes, instead of the word *authentic*, to substitute *principal*; and for *plagal*, *relative* or *collateral*. These distinctions in the Romish church are similar to the discriminations made by the Greek musical writers where they class their modes under the denominations of *principal* and *subordinate*, with the distinction of *kyper* and *hypo*. It is not surprising that the primitive Christians should give Greek names to the species of octaves in imitation of the Greek modes; nor, if we reflect on the simplicity that was aimed at, and the humble state of those who first employed music in their religious worship, shall we wonder at the incorrect and artless manner in which it was done. How the Roman church acquired Greek terms in canto fermo it is easy likewise to imagine, if we recollect that it was a present from Greek fathers: and Gregory, in reforming the mass, not only retained these Greek terms, but adopted others, both from the Greek and Hebrew languages and ceremonies, in order to conciliate parties, and acquire converts: as *Kyrie-Eleison* from the Greek, and *Hallelujah* from the Hebrew.

**PLAGIANTHUS**, in *Botany, so called by Forster, from *πλαγίος*, *oblique*, and *ανθος*, *a flower*, because of the oblique disposition of the petals, which gives the flower an irregular*

irregular appearance.—Forst. Gen. t. 43. Schreb. 459. Willd. Sp. Pl. v. 3. 719. Mart. Mill. Dict. v. 3. Juss. 274.—Class and order, *Monadelphica Dodecandria*. Nat. Ord. *Columnifera*, Linn. *Malvaceæ*, Juss.

Gen. Ch. Cal. Perianth simple, of one leaf, inferior, bell-shaped, with five small acute segments. Cor. Petals five, obovate, rounded, with claws, two of them folding over each other, at a distance from the rest. Stam. Filaments united into a cylinder, the length of the petals; anthers about twelve, ovate, crowded about the top of the cylinder. Pist. Germen superior, ovate, very small; style thread-shaped, concealed within the tube of the stamens; stigma club-shaped. Peric. Berry . . . . Seeds . . . .

Ess. Ch. Calyx simple, five-cleft. Petals five; two of them together, remote from the rest. Style one. Stigma club-shaped. Berry . . . .

1. *P. divaricatus*. Forst. Prodr. 47. Willd. n. 1.—Found by Forster in New Zealand.—A *shrub*, with alternate, smooth, slender *branches*, clothed with a smooth, shining, purplish-brown bark. *Buds* alternate, of two or three brown membranous scales. *Leaves* three or four from each bud, linear, somewhat obovate, bluntish, with a little point, entire, smooth, about half an inch long, tapering at the base, but scarcely stalked. *Flowers* solitary, adjoining to the leaf-buds, whitish, each on a recurved smooth *stalk*, not half the length of the leaves. We have, like Willdenow, merely seen one of Forster's dried specimens. Nothing can bear much less resemblance to a malvaceous plant, except that the inner bark seems fibrous. Willdenow most truly remarks that this genus has nothing in common with *Conarus*, to which it seems, by a manuscript note of the younger Linnæus, some great botanists had referred it.

PLAGIARA, or PLAGIARIA, in *Ancient Geography*, a town of Spain, in Lusitania, upon the route from Olisipo to Emerita, between Emerita and Budua, according to the Itinerary of Antonine.

PLAGIARY, in *Philology*, *Author-theft*; or the practice of purloining other people's works, and putting them off for a man's own.

Among the Romans, *plagiarius* was properly a person who bought, sold, or retained a freeman for a slave; so called, because the Flavian law condemned such a person *ad plagas*, to be whipped.

Thomasius has an express treatise *de plagio literario*; wherein he lays down the laws and measures of the right which authors have to one another's writings. Dictionary writers, at least such as meddle with arts and sciences, seem in this case to be exempted from the common laws of *meum and tuum*; they do not pretend to set up on their own bottom, nor to treat the reader at their own cost. Their works are supposed, in great measure, compositions of other people; and whatever they take from others, they do it avowedly. In effect, their quality gives them a title to appropriate every thing that may be for their purpose, wherever they find it, and they do no otherwise, than as the bee does, for the public service.

Their occupation is not pillaging, but collecting contributions; and, if you ask them their authority, they will produce you the practice of their predecessors of all ages and nations.

PLAGIAULUS, Πλαγιαυλος, among the *Ancients*, a kind of flute.

PLAGIOPATEUS, in *Natural History*, a term used by Artedi and others, to signify depressed, in opposition to the term cathoplateus, which signifies compressed.

PLAGIUM, in *Civil Law*, the offence of spiriting

away and stealing men and children: whence the offenders were called *plagiarii*, and were punishable with death. See KIDNAPPING.

PLAGIURI, in *Natural History*, the name of one of the great classes, or families of fish: the characters of which are, that the tail is placed horizontally; they respire by means of lungs, and have usually a double fistule in the head; they are viviparous, and the males have a penis and testes, the females the vulva, ovaria, mammae, &c. and they bring up their young with milk.

The term is derived from the Greek πλωγυρις, *transverse*, and ουρα, *a tail*.

Under this class of fish are comprehended the following genera: the *phyfeter*, *delphinus*, *balæna*, *monodon*, *catodon*, and *trichechus*; which see under their respective articles.

PLAGUE, λοιμος, *Pestis*, in *Medicine*, called also *pestilence*, *pestilentia*, *pestilitas*, a term which has been applied to various epidemic and fatal diseases, but is now limited by physicians to a contagious and malignant fever, which is accompanied by buboes and carbuncles.

Some corresponding appellation is to be found in all languages by which an extensive and destructive malady of this kind is designated. There is little doubt, however, that these raging epidemics have consisted of different maladies in different instances; having been sometimes the remittent fever originating from marsh effluvia, sometimes the true plague, and sometimes perhaps the small-pox, or scarlet fever; occasionally, too, even the *ignis sacer*, or epidemic land-scurvy, the result of a dearth of nutriment, appears to have been denominated pestilence. (See *IGNIS SACER*.) In many instances, the plagues described by historians are only depicted by the extent of the mortality and misery which they carried with them, and their peculiar symptoms are not detailed; so that it is impossible to ascertain the nature of the malady itself. And in some cases, though the phenomena of the disease are partially described, yet the general description is obscure and doubtful. Such is the character of the striking history of the plague at Athens, which has been left by Thucydides: it seems to be sufficiently distinct to prove that that epidemic was not the true plague; since the glandular swellings were not among the symptoms. The description of the state of the skin, indeed, impresses the notion of small-pox, rather than of any other contagious disease; for it is said to have been "red-dish or livid, with an eruption of *small pustules and sores*." (Πλουταινίαις μικραῖς καὶ ἔλκεσιν ἰξνηρόντος. Thucyd. lib. ii. § 49.) But some of the symptoms apparently belong to the *ignis sacer*. Lucretius has given a poetical translation of this history of the plague, as detailed by Thucydides. (Lib. vi.) Some of the plagues mentioned by Livy, as occurring among the Romans, do not appear to have been accompanied by the glandular tumours and carbuncles of the true plague.

In more modern times, the various forms of pestilence have been somewhat more accurately distinguished; and during the fifteenth, sixteenth, and seventeenth centuries, various countries both of Europe and Asia have been afflicted with the visitations of the true plague; so that its form and character have been but too well recognized. We shall endeavour to collect into one view the various appearances which it exhibits.

The nosological definition of the plague given by Dr. Cullen, is "a typhus fever, in the highest degree contagious, and accompanied with extreme debility. On an uncertain day of the disease there is an eruption of buboes or carbuncles." (Nosol. Method. Gen. 30.) On the whole,

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this brief character of the disease is as correct as any that can be given; for, in fact, the disease varies greatly in its appearances in different instances; inasmuch that even fever is by no means invariably present; and in the more fatal cases of plague, death terminates its course, before a sufficient time has elapsed to admit of the formation of buboes and carbuncles.

It is not easy to give a general history of the symptoms of the plague; because, in its different degrees of violence, its course and character exhibit very material variations. Hence it has been the practice of almost all the physicians, who have published their observations on the disease, to divide the congeries of symptoms into several classes: the physicians of Marseilles described five species of the malady, and Dr. Russell divided it into six; while Lange, Oræus, and others, speak only of three types which it assumed, or three degrees of violence, the mild, severe, and malignant.

The general derangement of the system, which ushers in an attack of the plague, is much like that which commences the course of ordinary fever. A sense of cold, with some shivering, which is soon followed by heat, and acceleration of the pulse, with giddiness, head-ache, depression of strength and spirits, white tongue, vomiting, or diarrhœa, and great oppression about the præcordia, are among the first symptoms of the disease. These are succeeded by a burning pain about the pit of the stomach, by a peculiar muddiness of the eyes, by coma, delirium, and other affections of the sensorium, which terminate by death in some cases on the second or third day, before the pathognomonic symptoms, buboes, and carbuncles, have appeared; but which, in others, continue to increase, while these morbid changes ensue, together with purple spots and ecchymoses, which belong to the plague, in common with other malignant fevers. Without attempting a description of the different classes of the plague as subdivided by the writers above-mentioned, we shall follow the laborious Dr. Russell through some of his remarks on the particular symptoms, as he observed the disease at Aleppo.

The fever is present at one stage or other of the plague with very few exceptions, though it differs materially in its degree, duration, and symptoms, in different individuals. It is usually preceded by a weariness and a confusion of head, which becomes a severe pain as the fever advances. The cold stage is short, and less marked than in an intermittent; but the changes in the succeeding hot fit are sudden, anomalous, and alarming. Nausea and vomiting frequently occur from the beginning; but these symptoms are absent in a large proportion, even in cases which terminate fatally. Indeed in many the attack is scarcely to be distinguished from that of ordinary fevers before the second night, unless where buboes and carbuncles arise within the first twenty-four hours. Although these remove all doubts about the nature of the fever, they do not, however, afford any certain prognosis of the event of the disease. In some cases clear remissions occur on the second or third day; but in general the changes from better to worse are frequent in the course of the first twenty-four hours, and more sudden and various than in common fevers. The disease in most cases advances with extreme rapidity, inasmuch that the patient on the second or third day is often in point of debility, disorder of the senses, and of the vital functions, reduced apparently to the condition of one in the last stage of a malignant fever; yet to this desperate state will succeed a remission, in which his senses and intellectual faculties are restored, and weakness only seems to remain. Nevertheless, these remissions, when occurring early in the disease,

or when not preceded by a sweat, are often short and fallacious: but when they follow a perspiration on the third day or later, and are of some hours continuance, they afford hopes of a favourable issue.

*Delirium* in the plague seldom becomes so violent and phrenitic, as in some other fevers. It sometimes comes on the first night, but in general not before the second; and is highest in the febrile exacerbations. Sometimes delirium alternates with coma, which last is in general a more dangerous symptom, but most particularly so when it comes on early, and does not abate in the remissions.

The change in the eyes, which has been described as a *muddiness*, is extremely remarkable. It sometimes takes place on the first day, but more commonly on the second or third, and remains till some favourable turn of the disease occurs. "It resembled somewhat the dull fixed eye observable in the last stages of malignant fevers, but the dullness was different, muddiness and lustre being strangely blended together:" and Dr. Russell adds, that it contributed much to that confusion of countenance, which enabled him, after a little experience, to pronounce with tolerable certainty on the existence or nonexistence of the plague. The tongue very often retains its natural appearance; and where it change its colour, it becomes only white, and remains moist, seldom becoming parched, and never putting on so thick a fur, or assuming so dark a colour, as in the advanced stages of some other fevers. The pulse is generally low, quick, and equal; and in the latter stages it becomes exceedingly quick and small, especially during the exacerbations, so as to be scarcely perceptible; yet in some cases, when the disease is considerably protracted, and other symptoms denote much disorder, the pulse varies little from its natural state. In fact, the variations of the pulse are often quite incongruous with the other symptoms. The respiration is little disordered, except in the advanced stage: there is no labor of the breath, nor cough; but there is an extreme anxiety and oppression about the præcordia, which produce great inquietude, and where they come on early, always dangerous symptoms. They are often accompanied by a pain and distressing sense of heat in the epigastrium, probably connected with the stomach, and rather increased than relieved by the vomiting.

The functions of the brain and nerves are particularly affected by the attack of the plague; so that a sudden and extreme prostration of strength belongs to the disease under all circumstances, and is, in fact, the most marked characteristic of its severe and fatal forms; the vital principle appearing to be suddenly as it were extinguished, or so enfeebled at once as to be incapable of resisting the violence of the disorder.

*Vomiting* did not occur in a very large proportion of the sick at Aleppo: but where it appeared at the beginning, and continued with short intervals, it generally denoted a fatal termination. The matter ejected from the stomach was various at the beginning, it was only the ordinary contents of the viscus; but after repeated reachings, bile commonly followed. Dr. Russell did not observe any fetid discharges from the stomach; but a blackish liquor sometimes came off in the last stage of the disease. A diarrhœa began sometimes on the first day, but more commonly in the advance of the complaint, and was generally considered as a dangerous symptom; but the stools were less offensive than those in tertian fevers in the same climate. Sometimes dark coloured blood was discharged by stool unmixed with feces, and without griping pains. As a looseness of the bowels was generally detrimental; so, on the other hand, a state

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of costiveness was attended with no harm or inconvenience.

But the peculiar and characteristic symptoms of the plague, as before stated, are the *buboes* and *carbuncles*, the former being observed in almost all those patients who are not carried off too rapidly to admit of their formation. The carbuncles, however, do not occur in more than one-third of the cases of plague, and very rarely exist alone, being generally conjoined with buboes. Buboes occur in the glands of the groin and arm-pits, and also in the parotid, maxillary, and cervical glands; but those of the groin are most frequently affected.

The inguinal pestilential bubo sometimes appears in the same place as the ordinary venereal tumour, but is commonly situated lower in the thigh. A burning and shooting pain is often felt in the part before any swelling is perceptible by the finger; but when once distinguishable, the gland is always painful on pressure. In the incipient state of the bubo, a small, hard, round tumour is felt under the finger, moveable under the skin, soft, and of its natural colour; but as the swelling increases, it assumes more of an oblong form, becomes less moveable, and the integuments become thickened and tumid. In some cases the swelling is acutely painful, in others obtusely so, and its progress is not less variable. The skin is seldom inflamed in any degree during the first week, though tense and painful; so that in the fatal cases, it generally retains the natural colour; indeed, unequivocal signs of the tendency to suppuration seldom occur till the fever abates, and is manifestly on the decline, as about the eighth or ninth day; the external inflammation then advances, the swelling becomes softer, and breaks between the fifteenth and twenty-second day, when treated simply with poultices. Those buboes which do not terminate in suppuration, usually disappear gradually, and disappear altogether in the second month: some of the inguinal tumours, however, remain hard and indolent for a longer time.

In a very large proportion of those who are attacked by the plague, the buboes begin to appear on the first day of the disease; sometimes they are even the very first symptom of infection; and sometimes they do not arise until the third day, or even later. Sometimes there is a succession of two or three buboes in the same patient.

The *anthrax*, or *carbuncle*, which is not unfrequently conjoined with the bubo, appears under some variety of form. Dr. Russell has described five, Dr. Gotwald (who saw the plague at Dantzic) four, and others three varieties of this pestilential sore. In different instances, it commences in the form of an inflamed pustule, of various size and colour, or of an angry pimple, tubercle, or slightly elevated red or livid spot; and instead of suppurating kindly, it becomes black, and forms a gangrenous eschar, surrounded by an inflamed and tumid margin. The part is affected with a pricking and burning pain. Dr. Bancroft observes, that when carbuncles appear very early, they assume a dark brown or black colour, and remain forty-eight hours or more without being circumscribed by an inflamed margin: they generally indicate the greatest danger. Most commonly, however, they appear only in the advanced stages; and where several occur in the same subject, they generally appear in quick succession. They are seated in different instances, on every external part of the body, even on the scrotum, and on the eye-brows; and when they concur with buboes, they usually appear on the same side of the body: sometimes, however, the carbuncles and buboes appear on the opposite sides. Sympathetic buboes occasionally arise in consequence of carbuncles; but they are less intensely

painful than primary buboes, and disappear when the carbuncles suppurate kindly.

Some other eruptive appearances occur during the plague, which are among the symptoms of all malignant fevers: these are especially *petechia* and *vibices*, or purple dots and blotches; some of them resembling in size and appearance the marks of flea-bites, and some the stripes and bruises of a whip. In some cases, a sort of marbled appearance of the skin takes place, or the surface is discoloured by narrow streaks of a brown, purplish, red, or livid colour. Most of these appearances, which are obviously of a petechial nature, were vulgarly called *tokens* in the plagues of London; being considered, and not unjustly, as commonly betokening the approach of death. Some of these indeed seem, from the description given by Dr. Hodges, to have been elevated, as if blood had been effused under the cuticle. "The *tokens*," he says, "were of various sizes, sometimes as small as a pin's head, sometimes larger, and as broad as a silver penny. Some were depressed, others prominent. They differed also in their degrees of hardness, some being easily penetrable by a needle or a pen-knife, &c. They were not all of the same colour, but often bore so strong a resemblance to warts, that they were often mistaken for them, not only by the vulgar, but even by the surgeons; and the author himself was sometimes obliged to have recourse to the needle for distinguishing them. A quick sensibility was a good sign, and those which went no farther than the skin would often slough off; whereas when they went deeper, they were deemed dangerous, especially when the part lost its feeling, and threatened sphacelation." (Hodges, *Loimologia*, p. 133.) The same excellent author describes another pestilential eruption; those of this kind were popularly called *blains*, and were a sort of blebs or *bulla*, containing ichor or serum. These, he says, were "vesications of size from a pea to a nutmeg, encompassed with a variegated circle, generally reddish. They arose with exquisite and shooting pain, and contained an ichor of a yellowish or straw colour, which was so acrid or caustic, that it soon corroded the vesicle, and burst out, of a colour yellowish, livid, or black. These pustules broke out in many parts of the body, their station and number being uncertain; sometimes few, sometimes many: in one case, the whole body was covered all over with them." (Loc. cit. p. 110.) In the directions published by the College of Physicians for the searchers, the latter are ordered to examine "whether there be any blains which may rise in any part of the body in form of a blister, much bigger than the small-pox, of a straw colour or livid colour, which latter is the worse; either of them hath a reddish circuit, something swollen, round about it; which circuit remains after the blister is broken, encompassing the sore." See Certain necessary Directions, by the King's special Command, Lond. 1665.

Such are the symptoms which characterize the formidable malady, the plague. In different cases, they are of course variously combined, and assume various degrees of violence, according to the age, strength, and constitution of the patient. They differ also materially according to the season, and to the particular period of the epidemic; inasmuch that the proportion of fatal cases, among those who are attacked at different periods of its prevalence, varies greatly. But the fatality of the disease is greater in general than that of any other malignant fever, and cuts off the majority of those whom it seizes, from two to seven days from its attack. All ages and conditions, every variety of constitution, strong and feeble, and both sexes under every circumstance, are liable to the infection; which, during those particular seasons in which it has become epidemic, has therefore

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committed the most dreadful destruction in the population of those towns and districts, which it has unhappily visited.

It may seem extraordinary that the origin of a disease, which has in all ages been the scourge of mankind, should have been always the subject of doubt, or at least of much difference of opinion. It is, however, to this day disputed, whether the plague be propagated by contagion or not; and it must be admitted that there are some difficulties attending either supposition. A similar discussion, indeed, has been carried on, with some acrimony, respecting the epidemics of our own times, especially respecting the yellow fever of the West Indies and America; and some even disputed the nature of the fever, which spread so extensively and fatally among our troops in the recent expedition to Walcheren. The most intelligent writers, however, concur in ascribing epidemic diseases to two sources; namely, to the miasmata or effluvia of marshes, and to contagion, or the exhalations and secreted matter from the bodies of persons diseased. To the former source, marsh effluvia, the intermittent and remittent fevers, which are endemic in particular districts at certain seasons of the year, and often extensively prevalent and fatal, are generally ascribed; and they are distinctly traceable to certain combinations of heat and humidity acting upon vegetable and animal soils. (See EPIDEMIC.) Hence in the autumnal season, flat, marshy countries, the seat of camps and other large congregations of men, and the uncleanly parts of crowded cities, have generally been observed to be productive of intermittent and remittent fevers. (See HEALTH of London.) Now some of these circumstances also concur in favouring the propagation, if not in giving origin to the plague; whence the difficulty of admitting the contagious source of the latter has arisen. It has also been stated, as an objection to the opinion that the plague is propagated by contagion, that, in many places, the disease is seldom entirely absent; yet that it rages epidemically and fatally only at particular times. Thus, it is collected from the bills of mortality of London, that, although there were but four great plague-years in this metropolis during the seventeenth century, namely, the years 1603, 1625, 1636, and 1665, (in the two first of which about 35,000, and in the last 68,000 died,) yet that there were but three years, from the commencement of the bills of mortality in 1603 until 1670, which were entirely free from the plague. In many of these intermediate years, indeed, the mortality of the disease was very considerable: for the bills exhibit 900 deaths by the plague, in 1604; 400, in 1605; 2000, in 1606; the same in the two following years; and even so late as from 1640 to 1648, the number every year exceeded 1000. (See Dr. Heberden's Treatise on the Increase and Decrease of different Diseases, p. 75.) Diemerbroeck remarks, in his excellent Treatise on the Plague, that whenever the plague has been excited out of its proper season, it has not spread; and it has been observed by Dr. Russell, that, in winter time, when infected persons have come to places about Aleppo, some of whom have died of the disease in the families where they lodged, the distemper was not, by such means propagated. Dr. Hodges has also stated, in a strong point of view, the total freedom from infection experienced by those persons, who had fled from London during the ravages of the plague, in the autumn of 1665, when they returned in the winter to the houses and beds in which their friends had died of the malady, without any previous purification having been made of the very linen and clothes which they had used. See his *Loimologia*.

It is likewise an indubitable fact, that the plague has

always first appeared and established its head-quarters in the filthiest parts of crowded, ill-constructed, and large cities, and has committed its most fatal ravages among the lowest of the people. Thus at Grand Cairo and Constantinople it appears almost annually. Blackmore takes notice that the impurity and filth, connected with the galleys and slaves at Marseilles, filled the air with offensive smells, easily perceivable by those that passed along the adjoining shore; and in 1720 the plague broke out there, in a part of the town thronged by the poorest people. In London, Dr. Heberden observes, the plagues of 1626 and 1636 broke out at Whitechapel, a part of the town which abounded with poor and with slaughter-houses; that of 1665 is said to have broken out first at St. Giles's; and there it would probably break out again, if ever we should suffer such another calamity. Hodges affirms, that in 1665 the disease was so much more prevalent among the lower classes, that it acquired the appellation of the *poor's plague*.

All these facts, however, when taken into consideration, along with the more positive evidence in favour of the actual contagion of the plague, perhaps tend only to prove that the human body is more predisposed to be acted upon by the contagion, under certain circumstances, which materially influence the state of the constitution. It must be admitted, indeed, as a matter of daily observation, that a certain predisposition of the body is requisite for the production of all diseases, and for the operation of contagion in particular: otherwise it could not happen that great numbers should escape during the whole reign of an epidemic; that at different seasons of the year, one and the same cause (a chill, for instance, or an act of intemperance) should produce very different diseases, a catarrh, a cholera, or a bilious fever. A particular state of the air is, in fact, absolutely necessary for the propagation of the contagion of the plague; for it is only during a season of moderate heat that it has ever been observed to prevail extensively. In Europe it has invariably raged most violently and fatally in the summer and autumnal months, especially in September. Thus in the plague of London in 1665, the deaths from the plague were, in June, 590; in July, 4129; in August, 20,046; in September, 26,230; in October, 14,373; in November, 3449; and in December, they were under 1000. (See the Bills of Mortality.) The cold weather of northern climates has invariably been observed to check the ravages of the plague. On the contrary, however, the extreme heat of southern latitudes is equally adverse to the propagation of the contagion; so that the disease is, in fact, unknown in tropical climates. In Egypt and Syria, its progress is always suspended during the hottest months of the year. (See Russell on the Plague, and Bancroft on Yellow Fever, p. 579.) "But a proper state of the air," to use the words of Dr. Heberden, "is not the only circumstance necessary to promote the operation of contagion. During the epidemical constitution, it is highly probable that good diet, and good spirits, and cleanliness, and fresh air, and proper clothing, and exercise, may all contribute to render the body less susceptible of disease; the seeds of which, like those of vegetables, will then only spring up and thrive, when they fall upon a soil convenient for their growth." (On the Increase and Decrease of different Diseases, p. 68.) These observations are corroborated by the fact, universally observed during the prevalence of the plague, that the principal ravages are committed upon the lower classes of the people; and they are perhaps farther confirmed, by the frequent occurrence of pestilence in combination with death and famine, according to the general testimony of historians, during which the people are not only ill-fed, but ill supplied

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with fuel, clothing, and other healthful accommodations, and also dispirited in the extreme.

Dr. Bancroft has collected some facts and testimonies which concur in pointing out the circumstances which induce a predisposition in the body to receive the contagion of the plague, or to resist its influence. He quotes Dr. Pugno's opinion, that the susceptibility of a person for the contagion is greatly increased by a moderately warm and moist atmosphere; that children, females, and persons of delicate feeble constitutions, are most apt to become infected; and that those who are naturally robust and vigorous seldom take the disease, unless weakened by excessive fatigue, watching, excessive venereal indulgence, or intoxication. Dr. Desgenettes remarks, that the plague seemed more particularly to attack those who are exposed to sudden transitions from a hot to a cold atmosphere, and *vice versa*, such as bakers, cooks, and blacksmiths; and that men addicted to excesses with women and spirituous liquors, very seldom recovered from the disease.

Dr. Bancroft has also adduced some observations, made by himself, in proof of the influence of atmospheric heat and cold, in both their extremes, in rendering the contagion dormant, or in suspending that susceptibility or affinity of the human body, without which it cannot produce disease in ordinary circumstances. Pestilential contagion, he observes, probably exists at all times in Lower Egypt, Syria, and many of the great cities of the Levant, and it is frequent on board Turkish and Greek vessels. When he was in Egypt, he remarked, that the obvious effect of heat in lessening the susceptibilities of individuals, or their aptitudes for taking the disease, was most evident in those who had lately arrived from cold climates, and who were comparatively most affected by the summer's heat; and ascribed his own escape, at that time, to that circumstance. "There were, however, persons in Egypt," he adds, "who had been long accustomed to greater degrees of heat, and who were therefore not rendered insusceptible of the disease, and some few of these caught it after it had become extinct in the British army, and when a person landed from England would not receive it, though he slept in an infected bed; and it was from this cause, that in the autumn of the same year, the disease began at Rosetta nearly two months before the usual time, *i.e.* on the 13th of September, when I first discovered it in two natives of the East Indies, attached to the Indian army; and it was propagated with some rapidity for six or eight weeks, among persons who were either born in, or had just come from, a climate *much hotter* than Egypt, whilst the British troops directly from England did not receive, and probably could not have been made to take the disease." On Yellow Fever, p. 591.

It is fortunate for mankind, as the same able author has remarked, that the communication of the contagion of the plague depends upon the co-operation of so many favourable circumstances, and particularly upon that of a suitable temperature, and of certain aptitudes and susceptibilities in the human subject; for without such requisites, or such obstacles to its propagation, the earth might have long since become desolate.

It would seem superfluous to enter into a long detail of facts to prove that the plague is a *contagious* disease, notwithstanding the refusal of some persons to admit the fact. The majority of the histories of the plague teem with evidences from which it is undeniably inferred. It is more especially to be inferred, however, from the circumstance of the multitude of medical attendants on the sick under this malady who have perished by its attacks, and parti-

cularly of those who have been under the necessity of the most close contact with the infected. Dr. Samoilowitz, who for many years officiated as an army surgeon in places where he had numerous opportunities of seeing persons under the plague, and especially during that of Moscow in 1771, has filled nearly one hundred pages of his treatise "sur la peste," with proofs of its contagious influence; and among these he mentions, that having successively volunteered his services as chief surgeon, in three of the principal hospitals of Moscow, *all* the assistant surgeons who were employed under him, fifteen in number, took the disease, which terminated fatally in eleven of them. The medical officers of the French army, during their campaign in Egypt, experienced the effects of the contagion to a great extent; about *eighty* of them perished by the plague within one year, according to Dr. Sotira, who was one of the survivors. He adds, that in the two following years, it was thought expedient to employ Turkish barbers to dress buboes, carbuncles, and blisters, as well as to bleed, and apply frictions of oil, under the inspection of French physicians and surgeons, and that, in consequence of this arrangement, only twelve medical officers died in twice the former time. He also states, that more than half of the Turks, who were thus employed to assist the French surgeons, took the plague, which, in several instances, proved mortal; though among a considerable number of other Turks, employed at Rosetta by the French *to bury the dead*, only one caught the disease. This is one of the many facts which indicate that there is comparatively little danger in handling the bodies of infected persons *after death*, than while alive. See Bancroft, *loc. cit.* and Gaetan Sotira, *Mem. sur la Peste, observée en Egypte*, p. 5.

The plague, which ravaged Marseilles in 1720, appears to have afforded ample evidence of its contagious nature. The report transmitted to the regent by M. Chicoyneau on the 18th of August, represents the physicians and surgeons as unanimous in their declaration, "that when one person in a family was attacked and died, the rest soon underwent the same fate, inasmuch that there were instances of families entirely destroyed in that manner; and if any one of an infected family fled to another house, the contagion accompanied him, and proved fatal to the family where he had taken refuge." (*Relation Historique*, p. 115.) It appears, too, from the historical record just quoted, that the first hospital opened for the infected proved fatal to all the attendants. The introduction of the plague into the Hôtel Dieu was traced to a woman received as a patient from the rue de l'Éscale, the street in which the distemper first broke out. Two of the nurses who assisted at her reception, and the matron who changed her linen, were taken ill the next day, and died after a few hours' illness. In consequence of the dreadful rapidity with which the contagion spread in that establishment, it destroyed physicians, surgeons, apothecaries, confessors, and all the other officers and servants, with the whole of the poor in the hospital, including above three hundred foundlings. The priests and monks who attended the infected suffered in the same manner as the medical assistants. And, lastly, of two hundred and thirty galley-slaves, employed in going into the infected houses, and burying the dead, two hundred and twenty perished in the space of ten or twelve days. The whole tenour of the history of that plague, indeed, concurs to establish the fact of its contagious nature. We shall, therefore, conclude this brief detail with the observations of Dr. Russell, suggested by his experience in the East.

"If of one hundred persons, exposed to the infection

of the plague by a near approach to the sick, ninety should fall ill, shall human inability to assign satisfactory reasons for the preservation of the other ten, be converted into a positive argument against the disease having been caught by contagion? If persons retired from all commerce with the infected and their attendants, breathing the same air with the rest of the inhabitants, and nourished by the same aliment, remain untouched during the ravage of the plague, as long as they continue secluded, but upon unguarded communication are taken ill like others,—can any rational doubt arise about the cause of their former security? Or if through stealth, or neglect of requisite precautions, substances tainted by the sick should be conveyed into these secluded retreats; and persons living temperately as before, ignorant of what had happened, and consequently in the midst of imaginary security, happen to be seized with the distemper,—can it with any show of reason be ascribed, not to contagion, but to terror, or to colluvies in the stomach and bowels, produced by intemperance and bad aliment? The instances here alluded to are not the creation of fancy, but strictly consonant to repeated experience in Turkey; to say nothing at present of what has been observed at Marseilles, and in various cities in Europe." Russell on the Plague, p. 208.

We cannot, therefore, but consider the *contagious* nature of the plague as satisfactorily proved, though not demonstrable. The principal difficulty in the way of an unqualified admission of the proposition, is the complete and often speedy eradication of the disease in a place, where no particular means of purification have been employed, by which the contagion might be removed or destroyed. But this difficulty is not insurmountable, as we have already attempted to shew, and as might be farther illustrated by a reference to the progress of those contagious diseases, which admit of no dispute, such as the small-pox and measles. For even these are only widely epidemic and feverishly fatal at particular seasons, when circumstances, that are not always cognizable, give a peculiar virulence to the contagion, or a predisposition to the human constitution to receive its influence.

The contagion of the plague, like that of the common malignant fever, or typhus, of temperate climates, and unlike that of small-pox, may infect a person a second time. Dr. Bancroft says, "two cases of *re-infection*, or second attacks of plague, fell under my observation in Egypt; one occurred in Mr. Webster, then an assistant surgeon, and the other in a soldier of the 27th regiment, each of whom had a bubo: they were, however, but slightly indisposed, the weather having become hot. Dr. Buchan had a second attack, but with only a small carbuncle, as he informed me. Dr. Price also had a second attack, without either bubo or carbuncle, but, according to his account, with a violent affection of the head and nervous system." In general," he adds, "I think second attacks are milder than the first, though Dr. Price informed me of his having seen a lad, who, under such an attack, died on the second day. Pugnolet says, that re-infections, when they occurred, were oftenest in persons who had been mildly treated by the first attack; and that several of these had the disease very violently the second time, immediately after using the bed or blanket of persons who had died of it." (Loc. cit. p. 599.) The fact of the occurrence of the plague in the same individual more than once, is, indeed, fully established upon the best authorities, although some have disputed it. Merceus says of the plague at Moscow, "Experientia comprobatur sit, hanc (pestem) illos non solum in variis vitæ periodis, sed et eadem epidemia, bis, aut sæpius occu-

pare posse." (Obs. Med. p. 123.) Dr. Russell also bears testimony to the same fact in the epidemics which he witnessed at Aleppo. Nevertheless, a second infection is admitted to be rather a rare occurrence, at least during the same epidemic. In above one hundred and twenty pestilential cases recorded by Diemerbroeck, there are only two in which the patients had been infected twice during the same season; but he had met with several instances of persons attacked at Nimeguen, who had suffered the plague some years before. (See Diemerbroeck De Peste, lib. iv. Hist. 37, and 45.) Whether the observation of Thucydides is thus sanctioned, as applicable to the true plague, may be questioned. He says that, in the plague of Athens, "those who recovered had much compassion on those who were dying, and those who lay sick, as having known the misery themselves, and were now in a secure condition, for it never seized the same person twice so as to be fatal." (Thucyd. de Bello Pelopon. lib. ii.) As the symptoms described by Thucydides were more analogous to those of the small-pox than of the true plague, as above stated; so this confidence of the convalescents in their security (which is not usual in cases of the true plague when epidemic) rather confirms the opinion the plague of Athens was small-pox.

With respect to the *treatment of the plague*, very little that is satisfactory can be collected from the writings of those who have witnessed its ravages. Dr. Bancroft expresses an opinion, that, until we know more of the ways and means by which nature endeavours to overcome it, we can perhaps do but little for her assistance, except by restraining all violent and dangerous symptoms, all excessive and debilitating evacuations, and supporting, when necessary, the powers of life, by a moderate use of wine, ether, opium, volatile alkali, and Peruvian bark. "The instances of persons who have strangely recovered from the plague, after having wandered alone about the country, particularly in Egypt, exposed to cold and wet, seem to indicate, that even the most moderate sweating is at best useless; but on the other hand, the unsuccessful trials made by Dr. Price, of the cold bath, afford no encouragement to repeat such applications to the surface. In some few cases, where the disease occurs in the vigorous and robust, and is accompanied with highly inflammatory symptoms, bleeding might perhaps prove beneficial, if employed within a few hours from the attack; though in general very bad effects appear to have resulted from this evacuation. Mild emetics are said, in some cases, to have proved beneficial, given at the very beginning of the disease."

This paragraph seems to contain the sum of the information, which is to be found in the records of modern medicine on the subject. *Blood-letting*, in general, is to be deprecated in a disease, in which the inflammatory symptoms are seldom considerable, and the depression of strength usually great and sudden. And in like manner, all violent evacuations, either by *emetics* or *purgatives*, appear to be detrimental, especially as violent vomiting and diarrhoea are apt to occur spontaneously, and are deemed very unfavourable symptoms. Dr. Russell remarks, that "the neglect of purging at the beginning was not followed by the consequences which might rationally have been expected," and, he adds, "I never saw any acute distemper, where costiveness was attended with so little inconvenience. Nevertheless, I think it rational, by gentle means, to clear the bowels at the beginning from any colluvies that might happen to be lodged there; for though that did not constantly prevent loosens, or other symptoms produced by matter pent up, and rendered more putrescent by the fever, yet I think it sometimes had that effect; and the passage of the bowels often appeared

peared to relieve the head, both in the augment and decline of the disease."

It appears to have been a very early and general opinion, as Dr. Bancroft remarks, among the physicians of this and other neighbouring countries, that those who were attacked with the plague, and other contagious diseases, had imbibed a *morbid poison*, and that it was necessary, above all things, to assist nature in expelling that poison from the body, and this principally by *sweating*, which Morton called the king's highway. In "certain rules, directions, or advertisements, for this time of pestilential contagion, first published for the behoofe of the city of London, in the visitation of 1603," and republished upon the recurrence of the plague in 1625, *copious sweatings* were directed to be excited by strong sudorifics, with warm beds and bed-clothes, "so soon as any of them (the poorer sort of people) apprehend themselves to be taken with the plague," and these were to be repeated every eight hours, and they were to "continue this course for four or five days;" and while they were sweating, it was ordered that they were not to be suffered "to rest or sleep." The same modes of treatment were adopted in the "advice set downe by the College of Physicians, by his majesties speciall command," which was printed in 1630. Not only strong sudorifics were enjoined, but it was directed "that there be good fires kept in and about the *visited houses*, and their neighbours," and "to make fires rather in pannes, to remove about the chambers, than in chimneys, the better to correct the ayre of the houses." In 1665, the College of Physicians were required by government to inspect the rules of former times, and make such alterations as they deemed proper; and among the directions which they then published, after mentioning bleeding, purging, and vomiting, they say "these three great remedies rarely have place in the plague, but are generally dangerous, and most of all purging, by any strong medicines," but express an opinion, that "the poison is best expelled by sweating, provoked by *posset-ale*, and *London treacle*" mixed; and order the patient to "be put to bed to sweat, well covered in a blanket, without his shirt, for twenty-four hours, every fifth hour renewing his cordial, but in half the quantity, between whiles refreshing him with posset drink, oatmeal caudle, or thin broths, made jelly wine, or hartshorn jelly;" and, if necessary, warm bricks, wetted with vinegar, and wrapped in flannel, were to be put to his feet, and care was to be taken, that he "sleep not till the sweat be over." *Blisters* were at the same time to be applied "behind the ears, about the wrists, near the arm-pits, on the insides of the thighs, and near the groin, to draw forth the venom. The buboes were to be "always drawn forth, and ripened, and broke with all speed."

Such was the universal practice employed in the plagues of the seventeenth century; and it is enough to have stated it to prove the mischievous consequences which it must have produced, to the satisfaction of every pathologist of the present day. The miliary fevers, of which the writers of those times speak so much, were the actual product of this violent excitement (see *MILIARIA*); and the small-pox was rendered doubly fatal by the same treatment. That coolness of the bed and apartment, with the most liberal admission of air, and the most complete rest that can be obtained, should be enforced under every form of fever, is now demonstrated beyond the possibility of dispute. And it is not less clearly ascertained, with respect to the management of the buboes, or glandular swellings, that, although it may be proper to promote their suppuration by emollient cataplasms, &c., where a natural disposition to that issue is evident; yet that there can be no danger or impropriety in

favouring their dispersion or resolution, by the usual means, when a spontaneous tendency to such a termination is observed. Dr. Bancroft justly says, "I know that the sudden retrocession of buboes, previous to suppuration, and whilst other symptoms indicating danger subsist unabated, is often followed by death. But this mortality is not in such cases produced by any change in the bubo itself, or by the retention of any matter which ought to be discharged, but by such an extreme diminution of the living power, or other injurious effects of the disease, as is incompatible with the continuation of a suppurating process, and also with the patient's recovery; and, therefore, this retrocession is to be considered not as the cause of death, but as an indication and consequence of that condition of the patient, from which death necessarily resulted; and on the other hand, when these glandular swellings rise, and suppurate favourably, they indicate such a state of the living power and of the system, as is likely to overcome the disease, without the supposed benefit of an evacuation of morbid poison by that suppuration. The same reasoning appears applicable to carbuncles, though in their gangrenous state, and when not surrounded by concentric inflamed rings, they require hot stimulant applications, and afterwards such as will promote a suppuration, and a separation of the carbonaceous crust." On Yellow Fever, &c. p. 617.

It may be added, that *mercurial* preparations were employed, and pushed as far as they could be carried, during the plague at Marseilles (according to M. Deidier) without any good effect. Orræus, Pugnet, and Sotira, likewise give their testimony to the same result of their own experience, even when carried to salivation. But where the disease is violent, it is obvious that sufficient time cannot be given to affect the salivary glands, even if the advantage of doing so were clear; and when they have been affected, it is probable that this was rather the effect, than the cause, of the mild and protracted state of the disease.

*Fricctions with oil* were strongly recommended by Mr. Baldwin for the cure of the plague; but the evidence in favour of their efficacy is very defective. These frictions, Dr. Bancroft informs us, were tried extensively by the French physicians in Egypt, and with very little, if any benefit, though in a few cases they seemed to give temporary ease. Pugnet indeed says, that they were not only useless, but caused anxiety and disturbance to the sick; that of fifteen patients to whom these frictions were applied, under the French physician Carrié, one recovered with difficulty, and all the rest died; and that where they seemed to do good, the disease was always mild. With so much reason to doubt of their efficacy, there is a strong objection to their use, arising from the very great danger of communicating the disease to the unfortunate person by whose hands they may be applied, and thus destroying many lives, without much probability of saving one. Bancroft, p. 623.

*Prevention of the Plague.*—The measures to be adopted for the prevention of the propagation of the plague are directed to two objects; namely, to the prevention of the introduction of the contagion into any town or country from those places where it prevails; and to the prevention of its propagation among the population, if it have already been introduced.

It seems to be generally admitted, that the plague does not originate in this country; and, therefore, from its insular situation, the infection can only be introduced through the medium of ships. Egypt, the Levant, and other parts of the Mediterranean, are seldom entirely free from the malady in the cool and temperate seasons; and probably, therefore, never free from the lurking contagion which the congenial

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congenial temperature annually brings into action. It is chiefly, therefore, through the medium of the commerce of the Mediterranean, that the importation of the contagion is to be apprehended; and to guard against this danger, the system of *quarantine* is adopted by the government of this country. It will not be necessary here to enter into a full detail of this system in all its parts, as it will be described under its proper head. (See *QUARANTINE*.) The objects of the system are, in the first place, to detain the individuals who may possibly have the infection lurking about them, a sufficient length of time from any communication with the people on shore, in order to ascertain whether the disease shall make its appearance in them; but, in the next place, to perform a still more important service, by subjecting all goods, clothes, and merchandize, which may retain infection, to a process of purification. It is well known, not only from numerous facts recorded in the history of almost all modern plagues, but from the testimony of the most experienced physicians in respect to malignant fevers in general, that these *fomites*, as they are called, or substances imbued with the contagion from the bodies of the sick, may retain their infectious quality an indefinite length of time, and do in fact more readily communicate the disease, than the persons of the infected. In addition, therefore, to the mere delay of the quarantine, the purification of the goods contained in the ships makes a principal part of that system; and it is chiefly accomplished by the establishment of lazarettoes and pest-houses, at the principal ports to which vessels from the Mediterranean usually come. The persons, if any prove to have been infected, and shew symptoms of the plague, are immediately removed to these houses, and separated from the healthy; and the goods are there also opened out, and exposed to the air, and fumigated with sulphurous vapours, and those of the mineral acids. (See *FUMIGATION*.) The most rigid adherence to the principle of separation, established by the quarantine laws, is enforced by the statutes, and the system appears to have answered the purpose of preventing the importation of pestilential contagion, since it has been fully practised.

If, however, these measures should fail to prevent the introduction of the plague into any large town, it then becomes expedient to devise the best means of preventing the spreading of the contagion among the people. This, indeed, is an object of difficult attainment. The first rise and appearance of the plague is not always recognized, and therefore it has often made considerable progress before any public measures are called for. The great rule of resisting in the beginning ("principiis obsta") is of peculiar importance in such a case; and it is much to be lamented, as Dr. Mead has remarked, that, in addition to this physical difficulty in the execution of the rule, the very steps which have commonly been taken by the police, with the view of arresting the contagion, have unfortunately had a direct tendency to impede the operation of this maxim, and to accelerate the progress of the epidemic. Dr. Mead justly states, that the directions of the magistrate, under such circumstances, ought to be such as to encourage the families first infected to make their misfortune known, for the sake of obtaining assistance, as much as if their house were on fire; whereas the measures usually adopted on these occasions have, in fact, been themselves a severe punishment, and must have contributed to make the infected conceal the disease as long as possible.

When the plague first shewed itself in London in 1665, the orders issued by the lord mayor and aldermen, and sanctioned by the College of Physicians, principally related to the strict imprisonment of the sick in their own houses, by

watchmen attending night and day at the doors to prevent communication; and this was to continue at least a month after all the family was dead or recovered. Each infected house was ordered "to be marked with a red cross of a foot long, in the middle of the door, evident to be seen, and with these usual printed words, that is to say, *Lord have mercy upon us*, to be set close over the same cross, there to continue until lawful opening of the same house." (See *Orders by the Lord Mayor and Aldermen, concerning the Infection of the Plague, 1665.*) Independently of the misery thus suffered by the families shut up, when comfort and assistance from friends is most required, and strangers to every thing but the melancholy view of the progress which death makes among themselves, the inefficacy of the plan to prevent the spread of contagion is obvious. The contagion must be accumulated and rendered more virulent by such confinement; "the shutting up houses in this manner," as Dr. Mead observes, "is only keeping so many seminaries of contagion, sooner or later to be dispersed abroad; for the waiting a month or longer from the death of the last patient, will avail no more than keeping a bale of infected goods unpacked; the poison will fly out, whenever the Pandora's box is opened." (Mead on the Plague, p. ii. chap. 2.) This plan, too, excited the universal apprehensions of the people, lest they should be shut up, which, probably, like all other impressions of fear, increased their liability to the infection. It occasioned the concealment of the disease as long as possible, which necessarily contributed to give it vigour, and to spread it; nor was it possible to maintain it rigidly; for many broke out of their confinement, by getting out at the windows, &c. or by bribing the watchmen at their doors, and sometimes by assaulting them; and thus contributed to propagate the contagion. On the other hand, there are some strong proofs recorded in the plagues of London in 1625 and 1636, of the diminution of the mortality which occurred after the sick houses were permitted to be open. See Mead, loc. cit.

On the actual occurrence, or on the apprehension of the occurrence, of the plague in any place, a council of health should immediately be appointed, consisting of some of the principal officers of state, some of the magistrates, and two or three physicians, &c.; and this council should be entrusted with such powers, as might enable them to enforce the execution of their orders with impartial justice, avoiding all unnecessary hardships. Instead of ignorant old women, who have generally been appointed *searchers* in parishes to examine the causes of death, that office should be committed to intelligent and active men, whose business it should be to report to the council of health the first occurrence of extraordinary deaths in any district, so that the suspected bodies should be examined by skilful physicians. The plague having almost invariably appeared among the poor in the outset, the measures to be adopted are principally applicable to that class of people. If, upon the report of the examiners and physicians, the plague is actually ascertained to have occurred, the families should be immediately removed, the sick and the found to different receptacles out of town, in which every care should be taken to purify the clothes and persons of both, on admission. The wealthy might be compelled to remove to their country houses, following a similar plan of separation and purification. From what is now known respecting the nature of contagion, it is certain that if these lazarettoes were kept in a cleanly and well-ventilated state, like the houses of recovery for typhus, there would be much less danger in giving attendance upon the sick, and the chance of recovery would be much augmented. It is well ascertained by experiment, that contagion is very much weakened

weakened in its virulence by dilution with fresh air, and that, in this diluted state, it may be breathed for a certain time with impunity. See *CONTAGION*, and *HOUSE of Recovery*.

There are many examples of the success with which these plans of early separation of the infected have been pursued. The magistrates of the city of Ferrara, in the year 1630, when all the surrounding country was infected with the plague, observing the ill consequences which every where ensued from endeavours to conceal the disease, by keeping the sick in their houses, resolved, whenever the occasion should occur, to adopt a different method. Accordingly as soon as they were informed that a person had died of the plague in their city, they immediately removed the whole family to which he belonged into a lazaretto, where they all, seven in number, died. But though the disease was thus malignant, it went no farther, being suppressed at once by this method. Within the space of a year, the same circumstance recurred seven or eight times, and the same proceeding put a stop to its progress. The example of this city was afterwards followed more than once in some other towns in the same territory, and with such complete success, that it was thought expedient, for the common good, to publish in the Memoirs of the people of Ferrara this declaration; "that the only remedy against the plague is to make the most early discovery of its occurrence that is possible, and thus to extinguish it in the very beginning." A very similar success was obtained by cardinal Gastaldi at Rome, in the plague of 1657. Being appointed commissary-general of health, with full powers, by the pope, he ordered all infected persons to be removed upon the first notice, to a lazaretto in the island of the Tiber, and all who lived in the same house with them, to other hospitals just without the city, in order to be sent to the island if they should fall sick. In two months he thus cleared the city of the plague, which had continued in it nearly two years; and it was particularly observed that, although previously, when the disease once got into a house, it seldom ceased without seizing the whole family, yet, under this management, scarcely five out of a hundred of the sound persons, thus removed, were infected. See Gastaldi, *de avertenda Peste*, cap. 10.

When the sick families are removed, their goods should be destroyed, or buried, and the walls and floors scoured, lime-washed, fumigated, and well aired. The streets and alleys should be cleaned with peculiar care, and washed daily if possible. It has generally been deemed advisable, too, to take up all beggars and vagrants who have no fixed residence, and may become a great cause for disseminating the contagion; and to prohibit all public amusements and assemblies of people, by which the disease might be communicated, through the promiscuous intercourse of such meetings.

Upon the supposition, (which is doubtless erroneous,) that the atmosphere is impregnated with contagion, or with some impurities which favour its propagation, the purification of the air has been an object of solicitude at all times, and *fire* has been recommended both by the ancients and moderns for this purpose. This opinion, however, seems to rest upon no better foundation, than a tradition that Hippocrates put a stop to a plague in Greece by kindling large fires; a circumstance which is nowhere mentioned in his works. It appears, indeed, that in after times these fires were made with juniper, cypress, resin, myrrh, and other aromatic weeds and gums, and that a sort of fumigation, and not the mere heat of fires, was the object of the practice. The experiment, when made in London, during the last plague, does not lead to any favourable inference respect-

ing the operation of this practice; for Dr. Hodges has stated, that fires having been ordered in all the streets for three days together, there died in one night immediately following no less than four thousand persons; whereas in any single week before or after twice that number had never been carried off. (*Loimologia*, p. 24.) The same observation appears to be applicable to the firing of guns, which would likewise be productive of the additional evil of exciting constant alarm, and disturbing the sick.

It is certainly desirable that the population should be thinned as much as possible, at the first appearance of the plague, by the departure of as many people from the town into the country as can conveniently do so. Those who are under the necessity of remaining, should adopt as far as possible a system of seclusion; for, however improper it may be to shut in the contagion, where it has already appeared, it must obviously be prudent to *shut it out*. Hence many persons have effectually preserved themselves and their families, in those countries where the plague often prevails, by shutting themselves up, and avoiding all unnecessary communication with the public, before any of them had received the infection. In large houses, in which a full ventilation could be accomplished, the chance of escape under this system of exclusion would be great; and even if any person should be taken suddenly ill, an immediate separation from the rest of the family would probably preserve them from the contagion. Dr. Russell, during the plague at Aleppo, shut himself up in his house, and prescribed to numerous patients who were brought to his window, which was a few feet above the ground, and by this plan escaped the infection entirely.

In houses in which the disease has already appeared, cleanliness and a free admission of air are the best preservatives; indeed, the circumstance of the comparative rarity of the diseases among the higher classes of society can only be explained upon this principle. Constant washing or mopping the apartments of the sick also contribute materially, by the coolness produced, to benefit the sick. The fumigations with aromatic herbs and gums, employed on those occasions, are not of any effectual use, and the very odours which they emit, rather conceal the presence of offensive vapours, than contribute to destroy them. The fumigations with the mineral acid vapours, obtained by decomposing nitre or common sea-salt, are, however, possessed of the power of destroying contagion. (See *FUMIGATION*.) The same fumigations, therefore, should be applied to the linen, beds, furniture, &c., in preference to the mere smoking, or the use of aromatic fumes, which were recommended previously to the discovery of these more efficient methods. See an ample account of the ancient modes of fumigation in Dr. Russell's *Treatise on the Plague*, book vi. ch. 6. p. 561—8.

The next means of prevention to be considered, are those by which individuals may defend their persons against the prevalent contagion. These, however, lie within a much smaller compass than the public appear to suppose. There is certainly no direct antidote against the infection, which can be externally worn, or internally taken. It were superfluous to describe the ingredients of the little bags, balls, ointments, and amulets, employed as preventives of the disease; as they have no claims whatever to the title of antidotes, and are, for the most part, either the offspring of empirical craft, or mere innocent devices, to give confidence to those who are under the necessity of approaching the sick. In this last view, indeed, such as do no harm may be admitted, in compliance with popular notions; but where such reliance is placed in them as to remove more important caution, even these are to be deprecated.

As to the alleged internal preservatives, with which the older medical books are copiously stored, they are in general composed of a complex farrago of herbs and gums, of very questionable properties of any kind. These have been copied, with very little alteration, from the formulæ of dark and ignorant times, and consist of a few medicated ales, distilled waters, and electuaries. It will be sufficient to mention one of these compositions, calculated for the rich, which was preserved among the revised directions of the College of Physicians in 1665, and was disgraced by the following ingredients; oriental bezoar, pearl, hyacinth stone, unicorn's horn, and lignum aloes, the proportion of the last article being about three grains to four hundred and fifty of the other ingredients. In truth, unless individuals have a strong prepossession in favour of these useless expedients, and lose all confidence without them, they may be fully dispensed with. The principal system of prevention that can be of any avail, must consist in maintaining that state of health in which we are least liable to suffer from the exciting causes of disease. We must neither weaken the body by evacuations, nor stimulate and excite plethora by high living. A temperate and regular course of life, and a temperate use of customary liquors, promise every advantage that can be expected from cordial and stomachic medicines; inanition, long fasting, immoderate watching, late hours, heated rooms, casual debauches, excessive fatigues, sudden changes in diet, should be cautiously avoided; inasmuch as whatever destroys the balance of moderate health, induces a predisposition to disease, under which contagion, like other occasional causes of disorder, more readily operates upon the system. Grief, terror, despondence, and other debilitating affections of the mind, have been universally held to be of most dangerous tendency in pestilential times; while, on the contrary, a regular flow of spirits, cheerfulness, a temper not given to anticipate evils, and a lively hope of escaping infection, are considered as the best safeguards against contagion. These, however, it is not in the power of medicine altogether to bestow; but this consideration affords the only apology for the use of the inert amulets before mentioned. The use of tobacco was considered by Diemerbroeck and others as conducive to repel the infection of the plague. But the experience of Dr. Russell led him to doubt the correctness of this opinion; as those who used tobacco copiously did not appear to be less liable to the disease than others. At Aleppo, indeed, the custom of smoking is universal both among men and women of all ranks, and therefore the very fact of the frequent prevalence of the plague seems to afford a refutation of this opinion. The best preservative is certainly to avoid a near approach to the sick, and especially to avoid the contact of the sick and of their clothes. The remarkable fact, mentioned by Dr. Samoilowitz, that all the assistant surgeons in the hospitals at Moscow, took the plague, while the physicians, who only walked among the sick, but carefully avoided contact, generally escaped, affords a strong proof of the greater facility with which actual contact communicates the infection.

*Moral Consequences of the Plague.*—Having stated every thing which appears to be material in the physical history of the plague, we cannot altogether omit the consideration of some of the moral evils, which have commonly been observed in the train of every severe pestilence. So urgent are the physical distresses which pestilence inflicts, and universal the interruption to the ordinary intercourse of social life which it occasions; so necessary is it for individual safety to shun all communication with others, and so difficult, therefore, to obtain assistance when in need of it;

that a system of selfish principles becomes every where prevalent, and the ordinary moral rules of conduct are every where laid aside; and vices, follies, and crimes, of every description, contribute to augment the sum of misery, which pestilence brings with it. The extreme uncertainty of the tenure of life, when every day may probably terminate it, seems to loosen the moral ties of the people, partly because multitudes of those who are the arbiters of individual character are destroyed, partly because, in the general confusion, the chance of escaping detection is much diminished, and partly because the probability of living to undergo punishment is exceedingly small. The extreme and sudden changes of fortune, too, which the death of whole families brings unexpectedly to many, unhinges the moral feelings, and leaves the indulgence of the passions to be pursued with little controul.

A striking picture of the dissolution of morals, during the prevalence of the pestilence at Athens, has been drawn by Thucydides. After stating that, in consequence of the dreadful mortality, the people, not knowing what to do, or whither to go, began to neglect all their duties sacred and profane, he first observes, that the rites of burial were not performed at all, from the destruction of servants and domestics, or performed in the most irregular manner. Some, he says, would take possession of the funeral piles erected by others, and anticipating their arrival, would lay the bodies of their friends upon them, and set them on fire; while others would deposit their corpse upon the burning pile containing one already partly consumed, and retire. "But this malady," he proceeds, "was the source of much greater depravities to the city in other respects. For people now dared to do many things openly, which they were heretofore compelled by shame to conceal; and they calculated upon their sudden change of fortune, seeing that many of the wealthy perished, while those who formerly were destitute, became rich with their property. They, therefore, deemed it right to set about the immediate enjoyment of it, and gave up all mind to pleasures, considering that they in turn might be deprived of the treasures, and of life itself in a few days. Nor was any individual disposed to undertake any labours for an honourable reward, because he thought it uncertain whether he should not die before he could obtain it. Whatever each person deemed agreeable or lucrative to himself, this he considered as expedient and honourable; and he did not allow himself to be restrained in the pursuit of it, either by the fear of God or of human laws. This indifference to all moral and religious duties, arose partly from the circumstance, that the fulfilment or neglect of them appeared to be equally unavailing; for all equally perished; and partly from the general expectation that no one would survive a sufficient length of time to undergo trial and punishment. And many persons, considering themselves already doomed by fate to worse punishment than the laws could inflict, determined to enjoy some of the pleasures of life before the time of suffering arrived." Thucydides, lib. ii. § 53.

Very similar accounts of the dissolute state of the public character, attendant on times of pestilence, are related by other writers, who have witnessed these calamities. In the interesting description of the plague at Florence in the year 1348, given by Boccaccio in the introduction to his Decamerone, many allusions are made to this lawless condition of the city. After describing the different views which some persons adopted as to the mode of self preservation; he says, "others maintained free living to be a better preservative, and would baulk no passion or appetite they wished to gratify, drinking and reveling incessantly from tavern to tavern,

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tavern, or in private houses, which were frequently found deserted by the owners, and therefore common to every one; yet avoiding, with all this irregularity, to come near the infected. And such at that time was the public distress, that the laws human and divine were no longer regarded; for the officers to put them in force being either dead, sick, or in want of persons to assist them, every one did just as he pleased." Again, he says, "I pass over the little regard that citizens or relations shewed to each other; for their terror was such, that a brother even fled from his brother, a wife from her husband, and, what is more uncommon, a parent from its own child." From the desertion of friends, and the scarcity of servants, who required enormous wages, multitudes died who might have been saved, and from mere necessity, he observes, many customs were introduced, different from what had before been known in the city. And he adds, it fared no better with the adjacent country; for, to omit the different castles about us, which presented the same view, in miniature, with the city, you might see the poor distressed labourers, with their families, without either the interference of physicians or help of servants, languishing on the highways, in the fields, and in their own houses, and dying rather like cattle than human creatures; and growing dissolute in their manners like the citizens, and careles of every thing, as supposing every day to be their last, their thoughts were not so much employed how to improve, as to make use of their substance for their present support, &c."

But while the dread of contagion and death have thus contributed to annihilate the best feelings of human nature, and to cut asunder all the moral ties of society, during the prevalence of pestilence; other passions of a selfish kind were also called into action, which overcame this fear, and actually led the people to rush into the presence of contagion, and thus to multiply the victims to its fatal malignity. Avarice was one of these misleading propensities. M. Bertrand, when describing the effects of the plague at Marseilles in 1720, remarks that "the avidity to take possession of an unexpected inheritance was also to many the fatal cause of their own destruction. Called to the entire succession of the wealth of a whole family, to whom perhaps they were very distantly related, and impatient to know the extent of their new acquisitions, they entered, without precaution, into infected houses, and searching indiscriminately among the effects of the deceased, they often found what they sought not, and paid with their lives the forfeit of their cupidity. Their fatal heritage then devolved to relations yet more remote, fortunate if they could profit by such an example, and not fall equally martyrs to indecent and unreasonable transports. It was not, however, always the legitimate heirs on whom the punishment of their avidity fell; it was often those who found *in the effects they stole* the just forfeit of their crime. In vain had the commandant absolutely prohibited the removal of any clothes or effects from one house to another; a blind and headstrong rapacity despised alike these wife ordonnances and the perils of the contagion." See Bertrand's Historical Relation of the Plague at Marseilles, translated by Miss Plumptre, chap. xix.

Avarice, however, was not the only passion which was excited in this extraordinary degree, and contributed to extend the infection. "Another abuse of a very singular nature," says M. Bertrand, "occasioned more than all this partial renewal of the malady. Will it be believed? scarcely had the contagion begun somewhat to diminish in its ravages, when the people, impatient to repair the mortality it had occasioned, thought of nothing but re-peopling the city by new marriages; like mariners who have been in im-

ninent peril of shipwreck, but are no sooner arrived in port, than, forgetting the danger they have escaped, they seek, in new pleasures, to drown the recollection of past troubles. Our temples, long shut up, were now only opened for the administration of this sacrament. A species of phrensy seemed to have seized on both sexes, which led them to conclude the affair, of all others the most important in the world, in the space of twenty-four hours, and to consummate it almost at the same instant. Widows, whose cheeks were yet moist with the tears they had shed over a dead husband; consoled themselves in the arms of a living one, who perhaps was in like manner snatched from them a few days after, and in a few days more they were wedded to a third." Some of the physicians imagined that this frantic passion was a consequence of the malady; but M. Bertrand explains it more plausibly upon the great change of circumstances which many had undergone; he might also have added, the extreme uncertainty of the tenure of life, and the consequent determination to make the most of its pleasures, which has been noticed above. The numerous marriages, however, thus hastily concluded, were the occasion of spreading afresh the fatal infection; so that the bishop determined that no marriage should be licensed, unless the parties demanding it could produce certificates of health from the physicians, and as the sickness abated, it became their principal occupation to receive the disagreeable visits of those who were frantic to rush into the bonds of marriage.

But these were not the only moral evils attending the pestilence, for every species of crime aggravated the sufferings of the unfortunate city. "If the people had shewn no other signs of having forgotten their past misfortunes, than the joy which these new marriages occasioned, there would have been no reason," says M. Bertrand, "to fear that a ceremony, honoured by the first miracle of our Saviour, authorized by the laws, and necessary to society, would irritate the Lord anew against us, provided all was conducted in conformity with Christian decency and rectitude. But what was likely to draw down upon us much greater judgments from his anger, were the thefts, the plunderings, and an infinity of other crimes, the horrors of which we dare not here retrace. For these their perpetrators promised themselves impunity on the part of men from the troubles of the contagion, and absolution on the part of heaven, by the favour it had shewn them, either in their having escaped the disease entirely, or recovered from it, when it proved mortal to so many thousands of their fellow-citizens. While the arm of the Lord was yet extended over us, a general licence was seen to reign among the people, a depravity of morals frightful to think on. Some seized on houses left vacant by the mortality; others forced open those that were shut up, or guarded by persons incapable of resistance. They entered those where, perhaps, there remained only one person languishing with the malady, forced open the closets and drawers, and took away whatever they found most precious, often carrying their infamy to the length of delivering themselves from an importunate witness, who had otherwise but a few moments to live. These enormous crimes, much more frequent in the height of the malady than in its decline, were generally committed either by those who served the sick, who carried away the dead, or who attended at the hospitals. By the declarations which these people, from their situations, were able to wring from the dying, they were informed of the state of their houses; nay, it often happened, that by the same means they got possession of their keys. This licence was yet greater in the country, where the distance of the battilles from each other, and the opportunity of going to

them in the night, favoured these criminal expeditions." Loc. cit.

These extracts present a picture of the moral evils which, in conjunction with the physical distresses attendant upon so severe and fatal a malady, render a season of pestilence the most formidable calamity that visits mankind. If the reader is desirous of a more ample detail of its horrors, he may peruse the whole of M. Bertrand's volume; the introduction of Boccaccio, before quoted; the *Traité de la Peste*, published by the physicians of Marseilles; the *Loimologia* of Dr. Hodges; and particularly an interesting *Journal of the Plague Year*, being observations or memorials of the most remarkable occurrences, as well public as private, which happened in London during the last great visitation in 1665. This journal, indeed, has been said to be the production of Daniel de Foe, and not, as its title page expresses, "written by a citizen, who continued all the while in London;" but it contains a true picture of the general consequences of the pestilence.

*PLAGUE-Water, Aqua Epidemica*, is one of the compound waters of the shops, distilled from mint, rosemary, angelica roots, &c.

PLAIAR, in *Geography*, a town of European Turkey, in Romania; 6 miles S. of Gallipoli.

PLAID, BELTED, in *Military Language*, the ancient garb of the Scots Highlanders, and still worn by some of our Highland regiments. The belted plaid consists of twelve yards of tartan, which are plaited, bound round the waist by a leathern belt, the upper part being attached to the left shoulder.

PLAIN, PLANUS, an epithet applied to various things, generally importing them to be smooth, even, level, or superficial, or simple, obvious, or the like.

In these senses, the words stand opposed to rough, solid, laboured, enriched, &c.

It is a maxim in heraldry, that the plainer the coat, the nearer to antiquity. Plain coats are such as are least encumbered with figures, or charges, and which have nothing in them but what is natural.

PLAIN, in *Heraldry*, is sometimes used for the point of the shield, when coupled square, a part remaining under the square, of a different colour, or metal, from the shield.

This has been sometimes used as a mark for bastardy, and called *champaigne*: for when the legitimate descendants of bastards have taken away the bar, fillet, or traverse, borne by their fathers, they are to cut the point of the shield with a different colour, called *plain*.

PLAIN, used substantively, in *Perspective, Mechanics, Astronomy, &c.* See PLANE.

PLAIN Angle, in *Geometry*, is an angle contained under two lines or surfaces.

It is so called in contradistinction to a *solid* angle.

PLAIN Figure. See PLANE.

PLAIN Triangle, is a triangle included under three right lines, or surfaces; in opposition to a *spherical*, and a *mixt* triangle.

PLAIN Trigonometry is the doctrine of plain triangles, their measures, proportions, &c.

PLAIN Chant, and PLAIN Song, in *Musick*. See CHANT, and CANTO FERMO.

PLAIN Counterpoint, is rigidly composed of common chords of note against note, without discords, and in characters of the same length, as in calvinistical and parochial psalmody. But, provided long and short syllables are distinguished, as in the 104th psalm, and the notes in vocal or instrumental music are struck together, it may still be called plain counterpoint. Very pleasing airs, à 4, in the

Greek church, are sung in this manner, not only note against note, but syllable against syllable, which renders the words well accented, and very intelligible.

PLAIN Descant. See DESCANT.

PLAIN Glass, or Mirror, in *Optics*, is a glass or mirror whose surface is flat, or even. See the phenomena and laws of plain mirrors, under the article MIRROR.

PLAIN Scale is a thin ruler, whereon are graduated the lines of chords, sines, tangents, secants, leagues, rhumbs, &c. of ready use in most parts of the mathematics, chiefly in navigation.

See its description and use under SCALE.

PLAIN Tyle. See TYLE.

PLAIN Chart, in *Navigation*, is a sea-chart, wherein the meridians and parallels are represented by parallel straight lines; and where, of consequence, the degrees of longitude are the same in all the parallels of latitude.

See the properties, construction, &c. of this chart under CHART.

PLAIN Sailing, is the art of working the several cases and varieties in a ship's motion on a plain chart.

Plain sailing is founded on the supposition of the earth being a plane or flat; which, though notoriously false, yet, places being laid down accordingly, and a long voyage broken into many short ones, the voyage may be tolerably performed by it, near the same meridian.

In plain sailing it is supposed that by the rhumb line, meridian, and parallel of latitude, there always will be formed a right-angled triangle; and that so posited, as that the perpendicular side may represent part of the meridian, or north and south line, containing the difference of latitude; the base of the triangle represent the departure; and the hypotenuse, the distance sailed. The angle at the vertex is the course, and the angle at the base, the complement of the course; any two of which, with the right-angle, being given, the triangle may be protracted, and the other three parts found.

For the doctrine of plain sailing, see SAILING.

PLAIN Table, in *Geometry, &c.* an instrument used in the surveying of land; whereby the draught, or plan, is taken on the spot, without any future protraction, or plotting.

The plain table, represented *Plate VI. Surveying, fig. 1.* consists of a parallelogram of wood about fifteen inches long and twelve broad; round this goes a boxen jointed frame, by means of which a sheet of paper is fastened tight to the table, so that lines may be conveniently drawn upon it.

On each side of the frame, which may be put on either side upwards, towards the inward edge, are scales of inches subdivided, for the ready drawing of parallel lines. Beside which, on one side are projected the 360 degrees of a circle, from a brass centre in the middle of the table (each degree halved) with two numbers to every tenth degree, the one expressing the degree, the other its complement to 360, to save subtraction: on the other side are projected the 180 degrees of a semicircle, from a brass centre in the middle of the table's length, and at  $\frac{1}{4}$ th of its breadth; each degree halved, and every tenth noted with two numbers, *viz.* the degree and its supplement, to 180°. To one side of the table is fitted a compass, for placing the instrument by; and the whole is fixed by a socket, upon a three-legged staff for a stand, on which it is turned round, or fastened by a screw, as occasion requires. Lastly, to the table belongs an index, which is a ruler at least sixteen inches long, and two broad; usually graduated with scales, &c. and having two sights perpendicularly placed on its extremities; and a sloped edge, called the fiducial edge.

*PLAIN Table, Use of the.*—To take an angle by the plain table; or to find the distance of two places accessible from the same third.

Suppose  $DA, DB$ , (*fig. 2.*) the sides of the angle required: or  $AB$  the distance required. Place the instrument horizontally, as near the angle as possible; and assume a point in the paper on the table, *v. gr. c.* To this point apply the edge of the index, turning it about this and that way till through the sights you see the point  $B$ : and, in this situation of the ruler, draw by its edge the line  $ce$  indefinitely.

After the same manner turn about the index on the same point till through the sights you see the point  $A$ ; and draw the right line  $cd$  indefinitely. Thus have you the quantity of the angle laid down.

Measure the lines  $DA, DB$ , with a chain; and from a scale set off the measures thus found on the respective lines; which suppose to reach from  $c$  to  $b$ , and from  $c$  to  $a$ . Thus will  $cb$  and  $ca$  be proportional to  $DB$  and  $DA$ . Transfer the distance  $ab$  to the same scale, and find its length; the length, thus found, will be the length, or distance of  $AB$  required.

2. *To find the distance of two places, one of which is inaccessible, by the plain table.*—Suppose the distance required  $AB$  (*fig. 3.*), and  $A$  the accessible point. 1. Place the plain table in  $C$ ; look through the sights till you see  $A$  and  $B$ ; and draw  $ac$  and  $cb$ . Measure the distance from your station to  $A$ ; and set it off from the scale upon  $ca$ . 2. Remove the table to  $A$ , where place it so as that the point  $a$  representing  $A$ , and the index laid along the line  $ac$ , you see backwards the former station  $C$ . [Note, in this fixing the instrument, lies the use of the compass; for the needle will hang over the same degree of the card in the first and the second case; so that some set the instrument by the needle alone; others only use it to shorten the trouble, by bringing the instrument nearly to its due position by means of it; and then fixing for good by the back sight]. 3. The instrument fixed, turn the sights to  $B$ ; and draw the line  $ab$ . 4. On the scale measure the interval  $ab$ ; which will be the distance of  $AB$  required.

3. *To find the distance of two inaccessible places by the plain table.*—Suppose the distance of  $AB$  (*fig. 4.*) required. 1. Choosing two stations in  $C$  and  $D$ ; in the first,  $C$ , place the plain table; and through the sights look to  $D, B$ , and  $A$ , drawing, by the edge of the index, the lines  $cd, cb, ca$ . 2. Measure the distance of the stations  $C, D$ ; and set this off from a scale on  $cd$ . 3. Removing the table from  $C$ , fix it in  $D$ ; so as the point  $d$  hanging over the place  $D$ , and the index lying along the line  $cd$ , through the sights you see the former station  $C$ . The instrument thus fixed, direct the sight to  $A$  and  $B$ , and draw the right lines  $da$  and  $db$ ; lastly, find the distance of  $ab$  on the scale, and this will be the distance of  $AB$  required. After the same manner may the distance of any number of places be found from two stations; and thus may a field, part of a country, &c. be surveyed.

4. *To take the plot of a field from one station, whence all the angles may be seen with the plain table.*—Placing the instrument in the station, assume a point in the paper, to represent the same, *v. gr. O* (*fig. 5.*); laying the edge of the index to this point, direct it to the several angles of the field,  $A, B, C, D, E, F$ , &c. and draw indefinite lines by its edge towards every angle; *viz. Oa, Ob, Oc, &c.*; measure the distance of each angle from the station, *viz. OA, OB, OC, OD, &c.* and from a scale set these off from  $O$  on their corresponding lines; the extremities hereof

will give points, which, being connected by lines, will represent the field.

5. *To take the plot of a field, wood, or the like, by going round the same, with the plain table.*—Place the instrument horizontally at the first angle, *v. gr. A*: the needle being on the meridian of the card; assuming a point on the paper to represent it; to that point lay the index, directing it till through the sights you see a mark in the angle  $B$ , and draw an indefinite line along it; measure the distance of  $A$  and  $B$ , and from a scale set it off on the line thus drawn; the extremity of this distance will represent the point  $B$ . Remove the instrument to  $B$ , where set it so as that the needle hang over the meridian of the card; and so as the index lying along the line last drawn, you see the former station  $A$  through the sights: here fasten it, lay the index to the point  $B$ , and turn it till through the sights you see the next angle  $C$ ; in this situation draw a line, as before, measure the distance  $BC$ , and set it off from a scale on the line. Remove the instrument to  $C$ , where fixing it by the needle, and the back sight, as before, turn the index on the point  $C$  till you see the next angle  $D$ ; draw the line, measure, and set off the distance  $CD$ , as before, and remove the plain table to  $E$ ; where fix it, as before; look to the next angle  $F$ , draw the line, measure and set off the distance, &c.

In this manner having compassed the whole field, you will have its whole perimeter plotted on the table; which may be now cast up, and its contents found, as in the article SURVEYING.

*Manner of shifting paper on the plain table.*—When in large parcels of grounds the plot is found to exceed the dimensions of the plain table, and to run off from the paper, the sheet must be taken off the table, and a fresh one put on: the way of managing which shifting is as follows: suppose  $H, K, M, Z$ , (*fig. 6.*) the limits of the plain table; so that having laid down the field from  $A$  to  $B$ , thence to  $C$  and  $D$ , you want room, the line  $DE$  running off the paper; draw as much of the line  $DE$  as the paper will well hold; *viz. DO*. And by means of the divisions on the edge of the frame, draw the line  $PQ$  through  $O$ , parallel to the edge of the table  $HM$ ; and through the point of intersection  $O$ , draw  $ON$  parallel to  $MZ$ . This done, take off the frame, remove the sheet, and put a fresh one (*fig. 7.*) in its stead; drawing on it a line  $RS$  near the other edge parallel thereto. Then lay the first sheet on the table, so that the line  $PQ$  lie exactly on the line  $RS$ , to the best advantage, as at  $O$ . Lastly, draw as much of the line  $OD$ , on the fresh sheet, as the table will hold; and from  $O$  continue the remainder of the line  $D$  to  $E$ . From  $E$  proceed with the work as before to  $F, G$ , and  $A$ .

*Use of the plain table, as a theodolite, semicircle, or circumferentor.*—The great inconveniency of the plain table is, that its paper renders its use impracticable in moist weather. Even the dew of the morning and evening is found to swell the paper considerably, and, of consequence, to distort the work. To avoid this inconveniency, and render the instrument useful in all weathers; by leaving off the paper, and setting up a pin in the centre, it becomes a theodolite, a semicircle, or a circumferentor, and is applicable like them.

The plain table, stripped of its paper, becomes either a theodolite, or a semicircle, as that side of the frame, which has the projection of the degrees of a circle, or a semicircle, is turned upwards. If it be to serve for a theodolite, the index (the plain table turning on any point as a centre) is constantly to turn about the brass centre-hole in the middle of the table.

If it be for a semicircle, it must turn on the other brass centre-hole; in both cases it is done by means of a pin raised in the holes. When the plain table is to serve as a circumferentor, screw the compass to the index, and both of them to the head of the staff, with a brass screw-pin fitted for the purpose; so that the staff and table standing fixed, the index, sights, &c. may be turned about, and *vice versa*.

To take an angle by the plain table, considered as a theodolite.—Suppose the quantity of the angle  $\text{EKG}$  (fig. 8.) required. Place the instrument at K, the theodolite side of the frame upwards, laying the index on the diameter. Turn the whole instrument about, the index remaining on the diameter till through the sights you spy E. Screw the instrument fast there, and turn the index on its centre till through the sights you spy G.

The degree here cut on the frame by the index, is the quantity of the angle sought; which may be laid down on paper by the rules of common protraction.

Thus you may proceed to do every thing with the plain table, as with the common theodolite.

To take an angle with a plain table, considered as a semicircle.—Proceed in the same manner with the instrument, considered as a semicircle, as when considered as a theodolite; only laying the semicircular side upwards, and turning the index on the other centre-hole in the middle of the length, and at about one-fourth of the breadth of the table.

To take an angle with the plain table, considered as a circumferentor.—Suppose the former angle  $\text{EKG}$  required. Place the instrument at K, the fleur-de-lis towards you. Direct the sights to E, and observe the degree cut by the south end of the needle, which suppose 296. Turn the instrument about, the fleur-de-lis still towards you, and direct the sight to G, noting the degree cut by the other end of the needle, which suppose 182. Subtract the less from the greater, the remainder,  $114^\circ$ , is the quantity of the angle sought. If the remainder chance to be more than  $180^\circ$ , then it must be again subtracted from 360. This second remainder will be the angle required; which may be protracted, &c. as under PROTRACTOR. Thus you may proceed to do every thing with the plain table, as with the common circumferentor.

PLAIN Place, in *Geometry*, *locus planus*, or *locus ad planum*, is a term which the ancient geometricians used for a geometrical locus, when it was a right line, or a circle, in opposition to a solid place, which was an ellipsis, parabola, or hyperbola.

These plain loci the moderns distinguish into *loci ad rectum*, and *loci ad circumulum*. See LOCUS.

PLAIN Problem, in *Mathematics*, is such a one as cannot be solved geometrically, but by the intersection either of a right line and a circle, or of the circumferences of two circles.

Such is the problem following. Given the greatest side, and the sum of the other two sides, of a right-angled triangle: to find the triangle. Such also is this, to describe a trapezium that shall make a given area of four given lines.

Such problems can only have two solutions, because a right line can only cut a circle, or one circle cut another in two points.

PLAIN du Nord, in *Geography*, a town on the N. coast of Hispaniola; 13 miles E.S.E. of Port de Paix.

PLAINFIELD, a township of America, formerly *St. Andrew's*, in Caledonia county, Vermont, 100 miles N.E. from Bennington; containing 543 inhabitants.—Also, a town-

ship of Hampshire county, Massachusetts, incorporated in 1785, and containing 977 inhabitants; 122 miles W. of Bolton.—Also, a township in Northampton county, Pennsylvania, containing 1439 inhabitants.—Also, a township in the N.W. corner of Cheshire county, New Hampshire, on the E. bank of Connecticut river, which separates it from Hartland in Vermont, incorporated in 1761, and containing 1463 inhabitants.—Also, a post-town in the S.E. part of Windham county, Connecticut, on the E. side of Quinabaug river, which divides it from Brooklyn and Canterbury. The soil is generally rich, and well cultivated, and well watered by the Quinabaug and Moosup rivers, together with many brooks and rivulets. It has two congregational meeting-houses, and an academy, with three handsome buildings appropriated to its use. The same was settled in 1689, and contains 1738 inhabitants; 14 miles N.E. from Norwich.

PLAINT, PLAINTÉ, in *Law*, the propounding or exhibiting any action, real or personal, in writing.

Hence, the party making this plaint is called plaintiff.

PLAINTAIN *Garden River*, in *Geography*, a river at the E. end of the island of Jamaica, and N. by W. of Point Morant. It has at its mouth a kind of bay, and on it, within land, is the town of Bath.

PLAINTÉ, in the *Ancient Customs of France*, was a request, or petition, presented to the king, against the judges of the provinces, and afterwards against bailiffs and seneschals for denying justice, or for rendering judgment contrary to the laws of the realm.

For in those days there was no appeal from their decisions; but they all pronounced in the dernier resort; so that the plainte was not directed against the party, but against the judge; who was cited to see his own sentence declared null.

This was a kind of supplement to the way of appeals, which was then shut up. The plaintes, in the Capitulars of Charlemagne, are called *blasphemiz*.

PLAINTIFF, in *Law*, he that sues or complains, in an assize, or in an action personal; as in an action of debt, trespass, deceit, detinue, and the like.

Plaintiff stands opposed to *defendant*.

PLAJOW, in *Geography*, a town of the island of Borneo; 150 miles N. of Banjar-Massin.

PLAISANCE, a town of France, in the department of the Gers, and chief place of a canton, in the district of Mirande; 22 miles W. of Auch. The place contains 1260, and the canton 8049 inhabitants, on a territory of 217½ kilometres, in 20 communes.

PLAISANCK, a town on the middle of the neck of the north peninsula of the island of Hispaniola; 12 leagues S.W. of Cape François.

PLAISANO, a town of Naples, in Calabria Ultra; six miles N. of Oppido.

PLAISE, in *Ichthyology*, the English name for the fish, called by authors *plateffa* and *passer levis*, by some *quadratus*, and the *pleuronectes plateffa* of Linnæus.

It is a flat fish, of a dusky olive-colour, spotted with red on the back, and white on the belly.

The plaise are common on most of our coasts; the best and largest are taken off Rye, on the coast of Sussex, and also off the Dutch coasts. They spawn in the beginning of February.

PLAISTER, in *Building*. See PLASTER, MORTAR &c.

PLAISTER,  *Casting in*. See CASTING.

PLAISTER, in *Medicine*. See EMPLASTRUM, and PLASTER.

PLAISTERED WALLS. See WALL.

PLAISTOW,

**PLAISTOW**, in *Geography*, a town of America, in Rockingham county, New Hampshire, containing 424 inhabitants.

**PLAISTOW**, a village in the parish of West-Ham, Effex. See WEST-HAM.

**PLAITING**, in *Rigging*, denotes braided cordage, made by rope-yarn, &c. twisted together, and then laid one over the other alternately; or the end of a rope opened, and the strands placed together in the same manner.

**PLAK**, in *Geography*, a town of Hungary; five miles S. of Caschau.

**PLAN**, a representation of something drawn on a plane. Such are maps, charts, and ichnographies.

**PLAN**, in *Architecture*, is particularly used for a draught of a building; such as it appears, or is intended to appear on the ground; shewing the extent, division, and distribution of its area into apartments, rooms, passages, &c.

The plan is the first device or sketch the architect makes; it is also called the *ground plot*, *platform*, and *ichnography*, of the building.

**PLAN**, *Geometrical*, is that in which the solid and vacant parts are represented in their natural proportion.

**PLAN**, *Raised*, is that where the elevation, or upright, is shewn, upon the geometrical plan, so as to hide the distribution. See ELEVATION.

**PLAN**, *Perspective*, is that conducted and exhibited by degradations, or diminutions, according to the rules of perspective.

To render plans intelligible, it is usual to distinguish the masses with a black wash. The projections on the ground are drawn in full lines, and those supposed over them in dotted lines. The augmentations or alterations to be made are distinguished by a colour different from what is already built; and the tints of each plan are made lighter as the stories are raised.

In large buildings it is usual to have three several plans for the first three stories.

**PLAN of a Bastion**, in the *Military Art*, is the same with the face of the bastion.

**PLAN**, in *Ship Building*, the section of a ship, as designed upon paper, previously to the actual building of which, three are the chief, *viz.* the plan of elevation or sheer-plan, the horizontal or half-breadth-plan, the plan of projection or body-plan; these three compose the *sheer-draught*. But it must be observed, that the extreme length, breadth, and height must be determined; by which the three plans aforesaid may be delineated. These may be called the outlines, and the several parts contained within them may be delineated so as to answer the intended purpose; and likewise have a distinct view of the whole design, so that any inconveniencies attending such a disposition may be easily remedied, and the true dimensions of every particular may then be had upon the draught.

The delineating a ship upon a plan is called drawing, and the representation is called a draught. See SHIP-BUILDING.

**PLAN**, in *Geography*, a town of Bohemia, in the circle of Pilsen; 66 miles W.S.W. of Prague. N. lat. 49° 52'. E. long. 12° 47'.

**PLAN**, *El*, a town of Spain, in Aragon; 15 miles N. of Amfa.

**PLAN Oler**, a town of Bohemia, in the circle of Bechin; 12 miles W.S.W. of Crumau.

**PLANA**, a town of Sweden, in West Gothland; 30 miles E.N.E. of Uddevalla.

**PLANA**, *La*, a town of Spain, in Valencia; 22 miles E. of Segorbe.

**PLANA**, or *Tabarca*, a small island in the Mediterranean, near the coast of Valencia, S.E. of cape St. Pola. N. lat. 37° 11'. W. long. 0° 34'.

**PLANARIA**, in *Ancient Geography*, an island situated on the coast of Italy, in the Ligurian sea, 60 miles from that of Corsica. Pliny.

**PLANARIA**, in *Vermeology*, a genus of worms of the order Intestina. The generic character is; body gelatinous, flattish, with a double ventral pore; the mouth is terminal. There are forty-nine species, divided into four sections, distinguished as to the number of their eyes or their being without eyes. The animals comprehended under this genus nearly resemble leeches, and like them live in fresh waters.

#### A. Without Eyes.

##### Species.

**STAGNALIS**. Ovate, brown, the fore-part pale. It inhabits the stagnant waters; the body is opaque, a little pointed on the fore-part, pellucid, with two milk-white spots; the eggs are numerous, whitish, placed at the sides.

**NIGRA**. Oblong, black, and truncate on the fore-part. It inhabits rivers.

**BRUNNEA**. Oblong, reddish-brown, with a longitudinal black line.

**CILIATA**. Body long, depressed, and ciliate. It is found in stagnant waters, under duck-weed: it is a very curious creature; the body is grey, appearing as if composed of granulations, with moveable bristles; the organ on the fore-part rotatory.

**GULO**. Body long, pellucid, and truncate before. This also is found in stagnant waters, under duck-weed; resembles the last, but is without the fringe, the margin all round is tessellate, with extremely fine striæ; it swallows the several species of the Cyclidium which inhabit the same waters, and after a time discharges them again. See CYCLIDIUM.

**PUNCTATA**. Body long, round, and green. Found early in the spring in wet meadows. The body is obtuse before, a little pointed behind, sprinkled with small black dots, and containing five red spherical pellucid eggs.

**FLACCIDA**. Body long, reddish-brown, with transverse white lines, and a lateral one. It is found among heaps of shells in the bays of Norway; when at rest it rolls itself up spirally, and then gradually dilates itself.

**ROSEA**. Body long, red. Found in the bays of Norway.

**ANGULATA**. Body long, reddish-brown, with two white angles on the fore-part. Found in the sandy bottoms of the ocean.

**RUBRA**. Body oblong, depressed, and of pale red. It inhabits the deeps of the Greenland shores. The body is marked with fine transverse lines above.

**VIRIDIS**. Body oblong, above convex, with transverse white streaks. Found among the roots of marine fuci.

**OPERCULATA**. Body subovate, grey, and furnished beneath with a lid which conceals the exfertile tube. Inhabits, though rarely, the sandy shores, particularly among fuci, in the bays of Norway. In appearance it seems to resemble a coffee berry, and moves by bending in its margin, and by means of its marginal folds fixes itself to and ascends other bodies.

**SUBULATA**. Body long, pointed on the fore-part, and truncate behind. It is found in great plenty among marine conservæ in Greenland, and the muddy bottoms of holes in rocks which constantly retain water, and proceeds with a serpentine kind of motion; but if the proboscis be touched it contracts itself suddenly into a minute cube.

**QUADRANGULARIS.** Body pale, ovate, very sharp-pointed before, and winged with small curled longitudinal membranes. It is found in ditches, among duck-weed; is very soft, pellucid, of a changeable form, and moves like a slug, leaving a slime on the bodies it passes over; when it meets another animal it draws itself in like a snail.

**BICORNIS.** Body oval, lanceolate, obtuse at each end, grey cinereous, dotted with black, with two very short divergent tubes on the fore-part. It is a native of those waters in Belgium that are covered with duck-weed: when irritated it fixes itself to other bodies, like the leech, by means of its tubes.

**GRISEA.** Body grey, dilated, elongated and pointed on the fore-part; the hind part is abbreviated and pointed. It inhabits the waters of lakes, among *confervæ*.

**FULVA.** Depressed, broadish, and pointed at each end, with a long black spot down the middle.

**VIRIDATA.** Oblong, round, green, and somewhat pointed at each end. It inhabits wet meadows in the autumn.

#### B. *With a single Eye.*

**GLAUCA.** The body of this is a little elongated, and cinereous, with a white iris. It is about a line long, pointed before and broadish behind, with sometimes a double black line in the middle of the back and meeting at the ends. A native of the waters.

**LINEATA.** Body long, above convex and cinereous, with a longitudinal pale line. This species is found on the shores of the Baltic; is about a line and a half long; beneath it is of a pale colour, with a brown patch in the middle, tapering before and dilated behind.

**RUTILANS.** Linear, with a black eye, and tapering to a point before. This is found in the Baltic, among fuci.

#### C. *With two Eyes.*

\* **FUSCA.** Black-brown, with a semi-pellucid whitish spot above the tail. It is found in slow streams upon and about aquatic plants. When at rest the body is circular, and seldom above a line in length; when in motion it is linear, and nearly half an inch long; its motion is uniform, smooth, by gliding along the stream.

\* **LACTEA.** Body depressed, oblong, whitish, and truncate on the fore-part. It is found in ponds and rivulets, but only in the summer season, and among aquatic plants. When in motion it is about an inch long: the body is marked with a white spot in the middle, the purple viscera elegantly branching round it; the margin is white and very transparent.

**TORVA.** Depressed, oblong, cinereous, or black and whitish beneath; the iris is white, it is something more than half an inch long.

**CHENATA.** Depressed, ovate-oblong, pale, with a crenulate margin. A native of Denmark.

**TENTACULATA.** Depressed, oblong, cinereous, and tubular on the fore-part. Inhabits stagnant waters, and three-quarters of an inch long.

**HELLUO.** Body ovate, round, green. It inhabits wet meadows, and is not a quarter of an inch long.

**OBSCURA.** Ovate-oblong, white, and obtuse at both ends. It is found in stagnant waters, and is about a line long, and sub-pellucid.

**ROSTRATA.** Oblong, hyaline; elongated at the extremity; the eyes are red. It inhabits marshes; about a line long; whitish, but with a purplish mass in the middle.

**ATOMATA.** Flat, membranaceous, white, with scatter-

ed rufous specks above. It is a native of the bays of Norway, and resembles the *DORIS oblevata*; which see.

**CORNUTA.** Flat, rather oblong, with a tentaculum or feeler from each side of the head. It inhabits the bays of Norway.

**RADIATA.** Oblong, rufous, with a white rose-like spot on the back. It inhabits wet woods, and resembles the *Vorticella radiata*.

**STRIGATA.** Oblong, pale, with three longitudinal lines. It inhabits wet marshes: the body is marked with rufous streaks.

**GROSSA.** Cylindrical, white with black eyes, and pointed at both ends. It is found among aquatic plants; it varies in size; the body is pellucid, with from five to more than thirty large spherical eggs.

**LINEARIS.** Long, roundish, and pale yellow. It inhabits wet hollows of woods, about a line and a half long, and ten times as narrow; the margin is pellucid and white.

**TERRESTRIS.** Linear; above convex, cinereous; beneath white. It is found in moist clumps among moss; it contracts and expands itself like a leech, and moves like a snail; body opaque and viscous.

**TETRAGONA.** Pale yellow, with four quadrangular lamellæ. It inhabits clear stagnant waters.

**CAPITATA.** Oblong, cinereous, with a distinct head. Found in the Baltic.

**CAUDATA.** Body rounded before, and tapering into a tail behind. Inhabits the shores of Greenland, among seawrack.

**AURICULATA.** Oblong, truncate and emarginate before, and acute behind. Found in the sea-water in Norway. It is a very minute worm, scarcely visible to the naked eye.

**FILARIS.** Linear, with a filiform contractile tail. Found on the *MADREPORA prolifera*, which see; it is about an inch long and a line broad.

**LINGUA.** Pellucid, brown-cinereous, and very obtuse at both ends. Found in fish-ponds in the autumn.

**GESSERENSIS.** Body long, green, and rufous behind the head. This is a native of Denmark, on the *Fucus furcillatus*.

#### E. *With four Eyes.*

**MARMORATA.** Oblong, blueish-grey or pale. Found in wet ditches, about half a line long; intestines glomerate, white, with a large round yellow spot in the middle.

**CANDIDA.** Body long, whitish, with a clear white line down the middle. It inhabits the shores of Greenland, under stones, and is about two or three inches long.

**TRUNCATA.** Pale reddish, broadly truncate before, and rather sharp behind.

#### F. *Eyes numerous.*

**TREMELLARIS.** Flat, membranaceous, pale yellow, with a sinuate margin. It is found in the Baltic, and resembles a *Tremella*, and is nine inches long. The body of this worm is greyish above; the disk is yellowish, with a pinnate line, in the middle, and behind this two white lunules; beneath it is whitish, with three milk-white spots.

**PLANCHES**, in *Geography*, a town of France, in the department of the Jura, and chief place of a canton, in the district of Poligny; 16 miles S.E. of Poligny. The place contains 333, and the canton 4218 inhabitants, on a territory of 117½ kilometres, in 10 communes.

**PLANCHIER**, or **PLANCERE**, in *Architecture*, the under part of the corona, or drip; making the superior part of the corniche, between two cymatiums.

PLANCKEN, in *Geography*, a town of Prussia, in Nantangen; 10 miles S.W. of Brandenburg.

PLANCOET, a town of France, in the department of the Northern Coasts, and chief place of a canton, in the district of Dinan; 8 miles N. W. of Dinan. The place contains 635, and the canton 13,522 inhabitants, on a territory of  $202\frac{1}{2}$  kilometres, in 12 communes.

PLANCY, a town of France, in the department of the Aube; 8 miles W. of Arcis-sur-Aube.

PLANE, PLANUM, in *Geometry*, denotes a plain figure, or a surface lying evenly between its bounding lines.

Wolfius defines plane, a surface, from every point of whose perimeter a right line may be drawn to every other point in the same.

As the right line is the shortest extent from one point to another, so is a plane the shortest extension between one line and another.

PLANES, *Oblique*. See OBLIQUE.

PLANES, *Parallel*. See PARALLEL.

PLANES are frequently used in *Astronomy*, &c. for imaginary surfaces, supposed to cut, and pass through, solid bodies, and on this foundation it is, that the whole doctrine of conic sections, and of the sphere, turns.

When a plane cuts a cone parallel to one of its sides, it makes a *parabola*; when it cuts the cone parallel to its base, it makes a *circle*. See each respectively.

The sphere is wholly explained by planes, imagined to cut the celestial luminaries, and to fill the areas or circumferences of the orbits; and they are differently inclined to each other; and by us the inhabitants of the earth, the plane of whose orbit is the plane of the ecliptic, their inclination is estimated with regard to this plane. See PLANETS.

PLANE, in *Mechanics*. A horizontal plane is a plane level or parallel to the horizon.

The determining how far any given plane, &c. deviates from a horizontal one, makes the whole business of *levelling*; which see.

PLANE, *Inclined*, is a plane which makes an oblique angle with a horizontal plane.

A machine has been contrived for measuring the acceleration of a ball down an inclined plane, and comparing it with that found in bodies falling at liberty. See its description in Mem. de l'Acad. Roy. de Scienc. 1699, p. 343.

The doctrine of the motion of bodies on inclined planes makes a very considerable article in mechanics; the general principle of it has been already illustrated under MECHANICAL POWERS, and the substance of it is as follows:

*Laws of Descent of Bodies on inclined Planes.*—I. If a body be placed on an inclined plane, its relative gravity will be to its absolute gravity as the height of the plane, *e. gr.* A B (*Plate XXXV. Mechan. fig. 1.*) to its length A C. For, the construction being as in the figure, it is evident that the absolute gravity, tending in a direction perpendicular to the horizon, is to the relative gravity in the direction of the plane, as D F : F G or D E, *i. e.* because the triangles D E F and B A C are equiangular, :: C A : A B.

Hence, 1. Since the ball D only gravitates on the inclined plane with its relative gravity, the weight L, applied in a direction parallel to the length of the plane, will retain or suspend it, provided its weight be to that of the ball, as the altitude of the plane B A is to its length A C.

2. If the length of the plane C A be taken for the whole sine or radius, A B will be the sine of the angle of inclination A C B. The absolute gravity of the body, therefore, is to its respective gravity applied to the inclined plane; and, therefore, also the weight D to the weight L, acting accord-

ing to the direction D A, which sustains it, as the whole sine is to the sine of the angle of inclination.

3. Hence the respective gravities of the same body on different inclined planes, are to each other as the sines of the angles of inclination.

4. The greater, therefore, the respective gravity is, the greater is the angle of inclination.

5. As, therefore, in a vertical plane, where the inclination is greatest, *viz.* perpendicular; the respective gravity degenerates into absolute; so in a horizontal plane, where there is no inclination, the respective gravity vanishes: and hence it appears, that the inclination of the plane may be so small, that the greatest weight may be sustained on it by the smallest power.

II. To find the sine of the angle of inclination of a plane, on which a given power will be able to sustain a given weight. Say, as the weight is to the given power, so is the whole sine to the sine of the angle of inclination of the plane. Thus, suppose a weight of 1000 be to be sustained by a power of 50, the angle of inclination will be found  $2^{\circ} 52'$ .

III. If the weight L descend according to the perpendicular direction A B, and raise up the weight D in a direction parallel to the inclined plane, the height of the ascent of D will be to that of the descent of L, as the sine of the angle of inclination C to the whole sine.

Hence, 1. The height of the descent C D of the weight L, is to the height of ascent D H of the weight D, reciprocally as the weight D to the equivalent weight L.

2. Since then  $C D \times L = D H \times D$ , and the actions of the equiponderating bodies D and L are equal; the moments of the weights D and L are in a ratio compounded of their masses, and the altitudes through which they ascend or descend in a plane either inclined or perpendicular.

3. The powers that raise weights through altitudes reciprocally proportional to them, are equal. This Des Cartes assumes as a principle whereby to demonstrate the power of machines.

Hence we see why a loaded waggon is drawn with more difficulty up an inclined than on an horizontal plane: as being pressed with a part of the weight which is to the whole weight in a ratio of the altitude of the plane, to its length.

IV. Weights E and F, *fig. 2.* equiponderating upon inclined planes A C and C B of the same height C D, are to each other as the lengths of the planes A C and C B.

S. Stevinus gives a very pretty demonstration of this theorem, which, for its easiness and ingenuity, we shall here add. Put a chain, whose parts do all exactly weigh in proportion to their length, over a triangle G I H (*fig. 3.*); it is evident the parts G K and K H do balance each other. If then I H did not balance G I, the preponderating part will prevail; and there would arise a perpetual motion of the chain about G I H: but this being absurd, it follows that the parts of the chain I H and G I, and consequently all other bodies which are as the lengths of the planes I H and I G, will balance each other.

V. A heavy body descends on an inclined plane, with a motion uniformly accelerated.

Hence, 1. The spaces of descent are in a duplicate ratio of the times, and likewise of the velocities; and therefore in equal times they increase according to the unequal numbers, 1, 3, 5, 7, 9, &c.

2. The space passed over by a heavy body descending on an inclined plane is subduple of that which it would pass over in the same time, with the velocity it has acquired at the end of its fall.

3. Heavy bodies, therefore, descend by the same laws on inclined planes as in perpendicular planes. Hence it was, that Galileo, to find the laws of perpendicular descent, made his experiments on inclined planes, because the motions are slower in the latter than the former; as in the following theorem.

VI. The velocity of a heavy body descending on an inclined plane, at the end of any given time, is to the velocity which it would acquire in falling perpendicularly in the same time, as the height of the inclined plane is to its length.

VII. The space passed over by a heavy body on an inclined plane  $AD$  (*fig. 4.*), is to the space  $AB$  it would pass over in the same time in a perpendicular plane, as its velocity on the inclined plane is to its velocity in the perpendicular descent, at the end of any given time.

Hence, 1. The space passed over on the inclined plane is to the space it would descend in the same time in the perpendicular plane, as the altitude of the plane  $AB$  to its length  $AC$ ; and, therefore, as the sine of the angle of inclination  $C$ , to the whole sine.

2. If, then, from the right angle  $B$ , a perpendicular be let fall to  $AC$ ;  $AC : AB :: AB : AD$ . So that in the same time wherein the body would fall perpendicularly from  $A$  to  $B$ ; in an inclined plane it will descend from  $A$  to  $D$ .

3. The space, therefore, of perpendicular descent being given in the altitude of the plane  $AB$ ; by letting fall a perpendicular from  $B$  to  $AC$ , we have the space  $AD$  to be passed over in the same time on the inclined plane.

4. In like manner, the space  $AD$ , passed over on the inclined plane, being given, we have the space  $AB$  through which it would descend perpendicularly in the same time, by raising a perpendicular at  $D$  meeting the altitude of the plane in  $B$ .

5. Hence in the circle  $CDEF$ , *fig. 5.*, the body will descend through all the planes  $AD$ ,  $AE$ ,  $AF$ ,  $AC$ , in the same time; *viz.* in that time wherein it would fall through the diameter  $AB$ , supposing that perpendicular to the horizontal plane  $LM$ : because all the angles  $D$ ,  $E$ ,  $F$ ,  $C$ , in the semicircle, are right angles.

VIII. The space  $AD$ , (*fig. 4.*) passed over an inclined plane  $AC$  being given, to determine the space which would be passed over in any other inclined plane in the same time.

From the point  $D$  erect a perpendicular  $DB$ , meeting the altitude  $AB$  in  $B$ ; then will  $AB$  be the space through which the body would fall perpendicularly in that time. Wherefore, if from  $B$  a perpendicular  $BE$  be let fall to the plane  $AF$ ;  $AE$  will be the space in the inclined plane which the body will pass over, in the same time wherein it falls perpendicularly from  $A$  to  $B$ ; and consequently  $AD$  will be the space in the other inclined plane  $AC$ , which it passes through in the same time.

Hence, since  $AB$  is to  $AD$  as the whole sine to the sine of the angle of inclination  $C$ ; and  $AB$  is to  $AE$  as the whole sine to the sine of the angle of inclination  $F$ ; the spaces  $AD$  and  $AE$ , which the body will pass over in the same time on different inclined planes, are as the sines of the angles of inclination  $C$  and  $F$ , and reciprocally as the respective gravities on the same planes. And, consequently, they are also reciprocally as the lengths of planes equally high,  $AC$  and  $AF$ . Whence the problem may be resolved various ways by calculation.

IX. The velocities acquired in the same time on different inclined planes, are as the spaces passed over in the same time.

For  $AD$ ,  $AB$ , and  $AE$ , are the spaces passed over in

the same time; and since  $AB : AC ::$  the velocity acquired in passing over  $AD$  to the velocity acquired in passing over  $AB$ ;  $AC : AF ::$  the velocity acquired in passing over  $AE$  to the velocity acquired in passing over  $AB$ ;  $AB : AC :: AD : AB$ ; and  $AB : AF :: AE : AB$ ; the velocity acquired in passing over  $AD$  is to the velocity acquired in  $AB :: AD : AB$ , and the velocity acquired through  $AE$  to the velocity through  $AB :: AE : AB$ ; therefore the velocities acquired in the same time in passing over  $AD$  and  $AE$  will be as the spaces of  $AD$  and  $AE$  passed through in the same time.

Hence, also, they are as the sines of the angles of inclination  $C$  and  $F$ ; reciprocally as the respective gravities on the same planes; and reciprocally as the lengths of equally high planes  $AC$  and  $AF$ .

X. A body descending on an inclined plane  $AC$ , when it arrives at the horizontal line  $CB$ , has acquired the same velocity which it would have acquired in a perpendicular descent  $AB$ , to the same horizontal line  $CB$ .

For  $AD$  is the space passed over in the same time with  $AB$ ; and, therefore, the celerity acquired in passing through  $AB$  is to that acquired through  $AD$  as  $AC$  to  $AB$ : but the celerity through  $AC$  is to that acquired through  $AD :: \sqrt{AC} : \sqrt{AD}$ ; and since  $AC : AB :: AB : AD$ ,  $AC : AD :: AC^2 : AB^2$ , and  $\sqrt{AC} : \sqrt{AD} :: AC : AB$ : consequently the celerity acquired through  $AC$  is to that acquired through  $AD$  as  $AC$  is to  $AB$ : therefore the celerity acquired through  $AC$  is equal to that acquired through  $AB$ .

Hence 1. A heavy body descending through different inclined planes  $AC$ ,  $AG$ ,  $AF$ , hath acquired the same velocity when it arrives at the same horizontal line  $BF$ .

Hence also, 2. A body, continuing its descent through several contiguous inclined planes, acquires the same velocity which it would acquire in descending perpendicularly to the same horizontal plane.

XI. The time of descent along an inclined plane  $AC$ , is to the time of perpendicular descent through  $AB$ , as the length of the plane  $AC$ , to its altitude  $AB$ : but the times of descent through different inclined planes equally high,  $AC$  and  $AG$ , are as the lengths of the planes.

For the time through  $AC$  is equal to the time in which  $AC$  would be described uniformly with half the celerity acquired in  $C$ ; and the time through  $AB$  is equal to that in which  $AB$  would be described uniformly with half the celerity acquired in  $B$ ; but these celerities are equal; consequently the times are as  $AC$  and  $AB$ . In the same manner it might be shewn, that the times of descent through  $AC$  and  $AG$ , are as  $AC$  and  $AG$ .

XII. If the diameter of a circle  $AB$  (*fig. 5.*) be perpendicular to the horizontal line  $LM$ ; a body will descend from any point of the periphery  $D$ ,  $E$ , or  $C$ , to  $B$ , along an inclined plane  $DB$ ,  $EB$ , and  $CB$ , in the same time in which it will descend through the diameter  $AB$ .

For, letting fall the perpendicular  $CG$ , the time in which  $GB$  is described is to the time in which  $BC$  is described as  $BG : BC$ ; but the time in which  $BC$  is described is to the time in which  $AB$  is described in the subduplicate ratio of  $BG$  to  $AB$ ; *i. e.* because  $BG : BC :: BC : AB$ , in the ratio of  $BG$  to  $BC$ : consequently, the time of descent through  $GB$  has the same ratio to the time of descent through  $BC$  and the diameter  $AB$ ; therefore the time in which  $BC$  is described is equal to the time in which  $AB$  is described, &c. Hence,

XIII. The descents of bodies through a semicycloid  $DEF$  (*fig. 6.*), and through any arc thereof  $DG$ , are al-

ways isochronal, or performed in the same time; on which principle is founded the doctrine of pendulums vibrating in a cycloid. See CYCLOID and PENDULUM.

The inclined plane is a mechanical power, often applied with advantage to practical purposes, and forms a very useful part of machinery in the elevation of great weights. It is supposed that in all the edifices of remote antiquity, where great masses of stone were employed, as in the pyramids of Egypt, and the druidical temples of this country, these vast blocks were elevated on inclined planes of earth, or of scaffolding, with the assistance also of levers and rollers. Inclined planes are frequently used for drawing boats out of one canal into another: and sometimes the local circumstances are such, that this may be done with great convenience, merely by allowing a loaded boat to descend, and to turn the axis which raises an empty one. An example of this may be seen, on a large scale, in the duke of Bridgewater's canal. This canal is extended, above ground, for forty miles on one level; an underground navigation, twelve miles long, joins it at Worsley, leading to the coal-mines under Walkden moor. At a height of  $35\frac{1}{2}$  yards above this, is another subterraneous portion, nearly six miles in length. The connection between these levels is formed by an inclined plane: the boats are let down loaded, and proceed three miles along the tunnel into the open canal. The inclined plane is fixed in a stratum of stone, which fortunately has the most eligible inclination of 1 in 4, and is 33 yards in thickness, affording the most advantageous means of fixing every part of the machinery with perfect security. The whole length of the plane is 151 yards, besides a lock of 18 yards at the upper end.

Inclined planes are used in many places for raising and lowering coal-wagons, so that one is brought up by the force of that which descends. Inclined planes are also universally employed for facilitating the ascent of heights, by men or by animals; they may be either uniform, as roads, or the general inclination of the surface may be superadded by the formation of separate steps or stairs. The inclination of the surface may be governed by the proportion of the strength of the animal to its weight, the force required to support any weight on a plane being to the whole weight as the height of the plane to its length, and if the plane be a little less inclined than the exact equilibrium would require, the animal will be able to acquire a sufficient velocity at first to carry it easily up the ascent with a motion nearly equal. The strength of a labourer may be advantageously employed in ascending a given height by a flight of steps, and placing himself on a stage which may raise a weight by its descent; but it appears that the force of other animals is less calculated for exertions of this kind.

PLANES, *Laws of Ascent of Bodies on inclined.*—I. If a body ascend in a medium void of resistance, in any direction, whether perpendicular, or along an inclined plane; its motion will be uniformly retarded.

Hence, 1. A body ascending either perpendicularly or obliquely, in such a medium, passes over a space which is subduplicate of that it would pass over in the same time on an horizontal plane, with an uniform celerity equal to that it has at the beginning of its motion.

2. Such spaces, therefore, performed in equal times, decrease in a retrograde order, as the uneven numbers 7, 5, 3, 1; and therefore the ascent is so much impeded; and consequently, when the impressed force is exhausted, the body will descend again by the force of gravity.

3. They are, therefore, inversely as the spaces described in the same times by a body descending through the same altitude. For, suppose the time divided into four parts; in

the first moment, the body A descends through the space 1, and B ascends through 7; in the second, A descends through 3, B ascends through 5, &c.

4. Hence a body, rising with an impressed force, ascends to that altitude, from which it must fall to acquire that velocity in falling with which it ascended.

5. Hence, by falling, it acquires a force to rise again to the height from which it fell.

II. The time in which a body ascends to a given altitude, being given; to determine the space passed over each moment.

Suppose the same body to descend from the same altitude in the same time; and find the spaces passed over each moment.

These, taken inversely, are the same with the spaces of ascent required.

Suppose, *v. gr.* a body projected perpendicularly, to ascend through a space of 240 feet: in four seconds; and the spaces of ascent performed in the several times required; if now the body had descended, the descent in the first minute had been 15 feet, in the second 45, in the third 75, in the fourth 105, &c. The descent therefore will be in the first moment 105, in the second 75, &c.

III. If a body descend either perpendicularly through A D (*fig. 6.*), or in any other surface F E D, and with the velocity it has there acquired, again ascend along another surface D C, at points equally high, *e. gr.* at G, H, and Q, it will have the same force, and the same velocity.

Hence, if a body descend along any surface F E D, and again descend along another similar and equal surface D G C, it is the same as if it passed over the several parts of the same line twice.

Whence, the times of ascent and descent through equal spaces are equal.

On this principle are founded the construction and use of pendulums.

PLANE of Gravity, or gravitation, is a plane supposed to pass through the centre of gravity of the body, and in the direction of its tendency; that is, perpendicular to the horizon.

PLANE of Reflection, in *Catoptrics*, is a plane which passes through the point of reflection; and is perpendicular to the plane of the glass, or reflecting body.

PLANE of Refraction is a plane drawn through the incident and refracted ray.

PLANE of the Horopter, in *Optics*, is a plane that passes through the horopter A B (*Plate VI. Optics, fig. 3.*) and is perpendicular to a plane passing through the two optic axes I C and C H. See HOROPTER.

PLANE of the Projection, in the *Stereographic Projection of the Sphere*, is the same with the *perspective plane*; which see.

PLANE of a Dial, or Dial-plane, the surface whereon a dial is drawn. See DIAL.

We have horizontal, vertical, inclining, declining, reclining, deinclining, direct, oblique, &c. dial-planes. See DECLINER, RECLINER, DIRECT, &c.

PLANE, *Declination and Inclination of a.* See DECLINATION and INCLINATION.

For the method of finding both, see DECLINATOR.

PLANE Glass, *Mirror, Figure, Number, Problem, &c.* See PLAIN Glass, *Mirror, Number, Figure, Problem, &c.*

PLANE, *Geometrical, in Perspective*, is a plane parallel to the horizon, whereon the object to be delineated is supposed to be placed.

This plane is usually at right angles with the perspective plane. See PERSPECTIVE.

**PLANE, Horizontal,** is a plane passing through the spectator's eye, parallel to the horizon, cutting the perspective plane, when it is perpendicular to the geometrical one, at right angles.

**PLANE, Objective,** is any plane situate in the horizontal plane, whose representation in perspective is required.

**PLANE, Perspective,** is a plain pellucid surface, ordinarily perpendicular to the horizon, and placed between the spectator's eye and the object he views; through which the optic rays, emitted from the several points of the object, are supposed to pass to the eye, and in their passage to leave marks that represent them on the said plane.

Some call it the *table*, or *picture*, because the draught or perspective, of the object, is supposed to be thereon; others the *section*, from its cutting the visual rays; and others the *glass*, from its supposed transparency. See PERSPECTIVE.

**PLANE, Vertical,** a plane passing through the spectator's eye, perpendicular to the geometrical plane, and usually at right angles to the perspective plane. See PERSPECTIVE.

**PLANE,** a tool used by artificers who work in wood, to produce straight, flat, and even surfaces upon that material. Almost all trades which fabricate articles of wood, employ planes at times; but as joiners make a greater use of these tools than any others, they are usually considered as joiners' and carpenters' tools. Planes have been, of late years, used by some artists to produce flat surfaces in metals. A plane operates to cut off a thin chip or shaving from the wood on which it is applied, by the sharp edge of a steel cutter or broad chissel, called, very improperly, the *plane iron*: this is fixed in a hole made through a wooden block, called the *plane stock*, and the edge of the iron projects a very small quantity through the lower side of the stock, called the *face* of the plane; the surface of which face is made a perfectly true plane. The iron is fixed in an inclined position in the hole through the stock, by means of a *wedge* driven in before it, to jamb it fast in the hole, which being wider than the thickness of the iron, leaves an aperture before the iron, called the *mouth* of the plane: this is very narrow where it opens in the lower side or face, but grows wider as it rises up through the stock; the wedge is also cut forked, to allow more room for the shavings which the plane iron cuts to pass up before it through the mouth. When a plane of this kind is applied with its face upon the surface of a piece of wood, and pressed down upon it whilst it is moved forwards, the edge of the iron penetrates the wood to the depth which it projects through the face, and removes a shaving of that thickness and the whole breadth of the edge of the iron, the shaving turning up before the iron passes through the mouth, and escaping. The inclination of the iron makes it cut easily; and if the iron is *set fine*, that is, if the edge projects but very little beyond the face, it will remove very thin shavings, and produce a flat and smooth surface: on the other hand, if it is *set rank*, that is, with a considerable projection, it will cut away very fall, producing a flat though rough surface, and quickly reducing the wood to its intended thickness: if the wood has an irregular surface, it soon reduces it to a plane, because the face, being flat, will not suffer the edge of the iron to descend into the hollow places, but removing all the eminences it passes over till they are reduced to one level.

This is a general description of several kinds of planes, which are all known by different names, from their different dimensions and purposes. Joiners use the *jack plane*, the *long plane*, *trying plane*, *shootng plane* or *jointer*, and the *smoothing plane*; all which they denominate *bench planes*, be-

cause the wood they are used upon is generally laid on the work-bench. They have also the *straight block* for straightening short edges, *rebating planes* for forming rebates; others, for the same use, are called the *moving fillister*, *fish fillister*, and *side-rebating plane*. The *plough* is a narrow plane, provided with apparatus to guide it, in moving straight, to plow a groove or trench at any required distance from the edge of a board or other piece of wood, and to any depth or width. The  *dado grooving plane* is also for forming grooves.

There are several other tools, which, having an iron fitted into a stock, are called planes, because they cut in the same manner, though, in strictness, they are not planes, for they do not make plane surfaces; these are *moulding planes*, with faces and cutting edges curved, to produce all the varieties of ornamental mouldings, and which are known by the names of *snipe's-bills*; *side snipe's-bills*, *beads*, *bollovs* and *rounds*, *ovolos* and *ogees*. The varieties and different sizes of these form a vast number, with which every complete joiner is furnished. It is impossible to describe the terms applied to these tools without figures, as they are arbitrary, though generally known among workmen. The faces of all these planes are straight in the direction of their length, but a section across the face is the impression or reverse of the moulding they are intended to make, and the edge of the iron is curved to correspond with this curve when in its place, but will in reality be a very different figure, because it is inclined to the face of the plane at an angle of about forty-five degrees. Another distinction between these and the bench planes is, that their mouths do not open so as to discharge the shaving through the stock at the top thereof, but the wedge completely fills the hole, and the shaving passes out sideways through a hole for that purpose; in some, these apertures are on the right, and in others on the left side; in the first case the shaving is said by the workmen to be thrown on the bench, that is, upon the right side of the plane; but when the orifice of discharge is on the left, and consequently the shaving thrown upon the left, then the plane is said to throw the shaving off the bench. The *compass plane* is used by coach makers, cabinet makers, &c.; it is made with a convex face, formed to an arc of a circle in the direction of its length, and it therefore forms the concave surface of a cylinder. The *forkstaff plane* is straight in the direction of its length, but its face is made concave in its breadth, to tie arc of a small cylinder; the edge of the iron is of course curved in the same manner, and it planes cylindrical surfaces. Coopers also employ long and heavy planes to form the edges of the staves of barrels; these are mounted in an inclined position on legs like a stool, with their faces upwards, and the staff is drawn backwards and forwards upon them.

Planes are so necessary for all kinds of work, that any who intend to work in wood, should understand the structure and the manner of using them. The *jack plane* is used for taking off the rough and prominent parts from the surface of the wood, and reducing it nearly to the intended thickness, in coarse shavings or slices. The stock of this plane is about seventeen inches in length, three inches high, and three and a half inches broad; all the sides are straight and at right angles to each other: the mouth is cut through the solid of the stock to receive the iron, and hold it at such an elevation, as to make an angle of forty-five degrees with the face of the plane; the iron is a thin metal plate, one side consisting of iron the other of steel; the lower end of the iron is ground to an acute angle off the iron side, forming a sloping part called the *basil* of the iron, so as to bring the steel side to a sharp edge: the wedge which fixes the iron in its place, is

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let into two grooves of the same form, on the sides of the opening or mouth: two sides of the wedge are parallel, and it is forked or cut away in the middle, leaving the sides like two prongs, to fill the lower part of these grooves; this allows the shaving to pass up without obstruction before the wedge: for the mouth or opening through the stock must be uninterrupted from the face to the top, and must be no wider on the face of the plane, than is sufficient for the thickest shaving to pass with ease; and as the shaving is discharged at the upper side of the plane, the opening through it must expand or increase from the face to the top, so as to prevent the shavings from sticking therein. A handle, called the *tole*, is fixed to the upper side of the stock, immediately behind the iron; it is formed to the shape of the hand, and direction of the motion, so as to produce the most power in pushing the plane forward.

A workman in using the jack plane, lays the piece of wood on the *bench* parallel to its sides, with the farther end lodged against the *bench-book*; then laying the fore-part of the plane upon the hind end of the wood, with the right hand he takes the handle, and pressing with his left upon the fore end, thrusts the plane forward in the direction of the fibre of the wood and length of the plane, until he has extended the stroke the whole length of his arm, the shaving being discharged at the orifice; he then draws back the plane, and repeats the operation in the next adjacent rough part, proceeding in this manner until he has removed the rough parts throughout the whole breadth. He then steps forwards the distance of the length he has planed, and operates upon another length in the same manner, proceeding this way by steps, until the whole length is gone over and rough planed. To do this is very easy; but a workman will not make good progress nor do clean work, unless he has first adjusted his tool properly for the work. The methods of doing this are nearly the same for all planes. The first care is to obtain a sharp cutting edge to the iron; if it requires grinding on the grindstone, the carpenter places his two thumbs under the iron, and the fingers of both hands above, laying the basil side to the grindstone, and holding it to the angle he intends it shall make with the steel side of it, keeping it steady while the stone revolves; and pressing the iron to the stone with his fingers; in order to prevent the stone from wearing the edge of the iron into irregularities, he moves it alternately from edge to edge of the stone, with so much pressure on the different parts as will reduce it to the required bevel, and make the edge straight.

The basil being brought to a proper angle, and the edge to a regular and slight curvature, the roughness occasioned by the gritty particles of the stone are taken away by rubbing its edge on a smooth flat hone or Turkey stone, sprinkled with olive oil on its surface. As the basil is generally ground, to give a more acute angle than the edge of the iron would stand, for the quicker dispatch of wetting it, the face of the iron is inclined nearer to the perpendicular, while it is rubbed backwards and forwards with the same inclination throughout. Every time the iron becomes dull or blunt by use, the sharpening is produced by grinding on the rubber-stone, or flat grindstone, or on a Turkey stone; but in repeating this, after the edge gets thick, it requires so much time to bring it up to an edge, that recourse must be had to the grindstone. The iron being thus sharpened, must be fixed in the plane by its wedge: the projection of the cutting-edge must be just so much beyond the face of the plane, as that the workman may be able to work it freely in the act of planing, and must be regulated by the stuff to be wrought; whether it is hard or soft, cross-grained or curling; so that a man may be able to perform the most work, or reduce the sub-

stance most in a given time. If the stuff is good and clean-grained, it is evident that a considerable projection may be allowed, as a thicker shaving may be taken: the extreme ends of the edge of the iron must never enter the wood, as this not only retards the progress of working, but chocks and prevents the regular discharge of the shavings at the orifice of the plane. The projection of the cutting-edge is called *iron*, and the plane is said to have more or less iron, as the projection is greater; when there is too much iron he knocks with a hammer on the fore end of the top of the stock, and the blows will loosen the wedge, and raise the iron in a certain degree, and the head of the wedge must be knocked down to fix it again.

When he has occasion to take out the iron to sharpen it, he strikes the fore end of the top of the stock smartly with the hammer, which loosens the wedge and the iron.

All the other bench planes are adjusted in the same manner, and indeed do not differ, except in dimensions, as we shall explain, from the jack plane. Of late years, a great improvement has been introduced in the irons of planes, to cause them to cut smooth; these are called double ironed: they were at first only used in the finest shooting planes, but the advantages have been found so great, particularly in planing bad wood, that they have become general for all sorts of planes. The double iron consists of a second iron, with a reversed basil screwed against the front side of the iron, so that its edge lies against the iron at a very small distance from, and parallel to, the cutting edge; and applying closely to the steel side of the iron, it forms an inclined plane, which turns the shaving over immediately after it is separated or cut up by the edge, and thus it prevents the iron from splitting the shaving deeper down than it will afterwards cut, and therefore leaving a rough or torn surface. This second iron is called the cover of the iron; and the basil of its edge, instead of being ground flat, as that of the iron, is rounding: the screw, which binds the cover upon the iron, passes through a slit in the cover, and thus admits of its edge being adjusted at any required distance from the cutting edges of the iron, and this distance depends altogether on the nature of the wood the plane is to be worked upon. If the stuff is clean-grained, the edge of the cover may be set at a considerable distance, because the difficulty of pushing the plane forwards becomes greater, as the edge of the cover is nearer the edge of the iron, and the contrary when more remote: this is occasioned by the edge of the cover turning the shaving over immediately it is cut up.

The *trying plane* is usually twenty-two inches long, three-quarters broad on the face, and three in height; it does not differ from the jack plane, except in having a double handle, adapted for greater force: in use, it succeeds the operation of the jack plane, to straighten the wood, and remove the ridges left by the former; it is set with less iron, and cuts a finer shaving: the mouth is also much narrower. When it is used upon a long piece of work, the workman takes every shaving the whole length, by stepping forwards, instead of stopping at arm's length, as with the jack plane. The shaving of this plane, though finer, is so much broader than the jack, that it requires as much force to push it forwards.

The *long plane* is set very fine for finishing work which is to be very straight; it is twenty-six inches long, three and a half broad, and three inches in height.

The *shooting plane*, or *jointer*, is the longest, and most correct plane used; it is employed after all the others, chiefly in shooting the straight edges of boards which are to be jointed together; it is generally made two feet and a half long,

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long, three inches and a quarter broad, and three and a half high; it is used like the others, but with great care to move it steadily from one end of the work to the other, without pressing it down, as that might spring the plane, or the work, and cause the iron to cut when the work was something hollow, whereas the object is to make a perfectly straight edge. The face of this plane must be kept quite true, and therefore it is a great object to make it of a fine piece of clean-grained, hard beech, well seasoned, that it may not warp, or vary, by the weather.

The *smoothing plane* is very short, without any handle, and its sides are curved, so that it very much resembles a coffin; it is seven inches and a half long, three broad at the mouth, and two inches and three quarters in height; it is used for finishing work when put together, and to give the greatest degree of smoothness to the wood, for which purpose it is set with as fine an edge as possible.

*Rebating planes* are used for cutting out rebates; these are a kind of semi-grooves upon the edge of a board, or other piece of wood, formed by cutting down or reducing a small part of the breadth of the board to half, more or less, of the general thickness: by this means, if a rebate is cut on the upper side of one board, and the lower side of another, the two may be made to overlap each other, without making them any thicker at the joint. Rebates are also used for ornamenting mouldings, and many other purposes in joiners' work. The planes for cutting them are of different kinds, some having the cutting edge at the side of the iron and of the stock, others at the bottom edge of the iron and the face of the stock, and others cutting in both these directions; the former, being used to smooth the side of the rebate, are therefore called side-rebating planes; whilst the others are used for smoothing the bottom. There is also a third sort, called *fillisters*, used for sinking, or cutting away the edge of the piece of wood to form the rebate, leaving it for the others to smooth the surfaces when cut. The rebate planes are about nine inches and a half long, and of various widths upon the face, from half an inch to an inch and three quarters; in all cases they have the mouth and the edge of the iron coming out at one edge of the face, and the side of the iron also exposed at one of the upright sides of the stock, whether it is formed with a cutting edge there or not: this exposed side is either on the right or left, and they are named accordingly. In all cases they throw the shaving out on the side, instead of at the top of the stock. The cutting edges and mouths are generally situated obliquely across the face, instead of being at right angles to the length of the plane, as in others.

The *moving fillister* is a rebating plane, which has a ruler of wood, called the *fence*, fixed upon its face by screws in the direction of its length, and exactly parallel to the edge of the face; it therefore covers part of the length of the cutting edge, and can be fixed at any required distance from the edge, to leave more or less of the cutting edge exposed, and this quantity will be the breadth of the rebate it will cut; because when it is used, the edge of the fence is applied against the edge of the piece to be rebated, and thus gauges the breadth its iron shall cut away. The cutting edge of this plane is not situated at right angles to the length of the stock, but has an obliquity of about forty-five degrees, the exposed side of the iron being more forwards than the other. By this obliquity, when the plane is worked, it has a tendency or drift to run farther into the breadth of the wood, but as the fence, sliding against the edge, prevents this, the drift always keeps the fence in contact with the edge, without the

attention of the workmen; it also causes the iron to cut the bottom of the rebate smoother, particularly in a transverse direction to the fibres, or where the stuff is cross-grained, than could otherwise be done, when the steel face of the iron is perpendicular to the vertical sides of the plane. The principal use is, however, to contribute, with the form of the cavity, to throw the shaving into a cylindrical form, and thereby making it issue from one side of the plane. The iron is what is called shouldered, that is, the lower part or shoulder where the edge is, has double the width of the upper part, which is received into the mortise, and jammed fast by the wedge. It is the edge of this wide part only which is exposed at the side of the stock. Besides this principal iron, there is another small iron, called the tooth, which precedes the other, to scratch or cut a deep crack at the width of the rebate, thus making the shavings which the iron cuts up from the bottom separate sideways from the rest of the wood. This tooth is inserted in a vertical mortise through the stock, between the fore end of the stock and the iron. The lower end of this little iron is ground with a bevel on the inside, so as to bring the bottom of the narrow side of the iron to a very convex edge; it is fastened by a wedge passing down before it in the mortise in the stock. The use of this tooth is principally for cutting the wood transversely when wrought across the fibres, and by this means it not only cuts the vertical side of the rebate quite smooth, but prevents the iron from ragging or tearing the stuff. The iron between the fence and the edge of the face of the plane, must project the whole breadth of the uncovered part of the face, otherwise the wood of the plane will bear it up, and prevent the plane sinking as it cuts away the rebate, and the edge of the tooth or little iron should stand out a little farther on the side of the plane than the iron. The depth of the rebate which this plane will cut, is regulated by a stop fixed on the outside of the plane, at the intended height above the level of the face: then, when the plane has penetrated or sunk the intended depth of the rebate, the stop comes to bear upon the solid of the wood beyond the rebate, and bears it off from cutting any longer. The stop is a piece of brass, which moves in a vertical groove made in the side of the stock, between the iron and the fore end of the plane; in this it is moved up and down by a screw, which is inserted in a vertical perforation from the top of the plane to the groove, and passing through a part projecting from the stop into the groove: the upper part of the screw is formed to a thumb-nut, to turn it round by, and it is so confined by proper collars, that it can neither move up nor down; but being turned, the inclination of the threads will rise or fall according to the direction in which the thumb-screw is turned, and cause the stop to move up and down in the groove on the side of the plane, thus regulating it at pleasure to the depth to which the rebate is required to be sunk.

In grinding and fixing the iron of this plane, it is necessary that the cutting edge of the iron should stand equally prominent in all parts out of the face, otherwise the plane cannot make shavings of an equal thickness; and, consequently, instead of keeping the vertical position, will, as it proceeds, become deeper on the side on which the shavings are thickest, and then the part cut away will not be regular, for the bottom of the rebate will not be parallel to the upper surface of the wood, and the side which ought to have been vertical, will be a kind of a ragged curved surface, formed by as many gradations or steps in the depth as the number of shavings.

The *fixed fillister* differs in several particulars from the moving

ing fillister: the breadth of the iron is something more than the whole breadth of the sole, so that the extremities of the cutting edge are in a small degree without the vertical sides of the stock: the fence is adapted to be moved to a considerable distance, not being fixed, as in the moving fillister, by screws upon the face, but sustained by two bars fixed fast to it, which pass through the two vertical sides of the stock, at right angles to the sides, fitting tight in the two holes through which they pass; these bars are made rounding upon the upper side and flat on the lower side: at the point where they are united to the fence, they have thicker parts, or shoulders, projecting downwards, because it is necessary to have the fence fixed on a lower level than the face of the plane: the ends of the bars are ferruled, to prevent splitting when the ends are struck with a mallet, in order to move them in the holes through the stock, and this brings the fence either nearer or more remote from the stock, as may be wanted; and to fix it fast, when so adjusted, two small tapering pieces of wood, called keys, are inserted into two small wedge-like mortises, cut at the sides of the mortises in which the bars pass through the stem; these wedges being drawn in, they will stick fast, and press against the bars, keeping them fast at all points, and thereby regulate the distance of the fence from the vertical side of the stock. This plane is generally employed to rebate narrow pieces of wood, such as sash frames; and the fence is applied against the opposite edge of the wood to that on which the rebate is to be formed.

The *plough* is a plane with a very narrow face, made of iron, fixed beneath a wooden stock, and projecting down from the wood of the stock, the edge of the iron being the full width, or rather more, than the face; it is guided by a fence with two bars, like the fillister above described, to make or plough out a groove of the width of the iron, and at any required distance from the edge of the wood; it has also a similar stop to regulate the depth it cuts to.

*Plane for planing surfaces of Metal.*—This tool has been brought into use within these few years past, to the great improvement of the work of those artists who employ it. These are chiefly the mathematical instrument-makers who are in the constant habit of having to make straight rulers in brass, and prepare work requiring very flat surfaces, such as the limbs of sextants, &c.; but all trades which work in brass and iron, would find their advantage in employing the plane. The stock of this plane is usually made of cast-iron, in form of a hollow box, the bottom, sides, and ends being all cast in one piece; it is usually 12 inches in length,  $1\frac{3}{4}$  in height, and  $1\frac{1}{2}$  in breadth across the face; the iron is situated at about four inches from the fore end, not inclined, as in other planes, but held in a perpendicular direction, with its lower or cutting edge passing through the mouth, and projecting the least possible quantity beneath the surface of the face, but leaving only so small a space before the edge for a mouth, as will but just admit a piece of thick paper; the iron is held against a brass frame fixed across in the hollow of the box or plane, and containing within it a screw, on which a nut or slider is fitted, to rise and fall when the screw is turned round by a milled head upon the upper end of it; the nut or slider has a projecting pin, which enters into a round hole made through the iron; and in this case, by turning the screw, the iron is raised or depressed, to cause the edge to protrude more or less beyond the face; to support this frame behind, a block of wood is fitted into the hollow of the stock, to fill up all the cavity, and it projects so much above as to form the handle for the plane.

In the front end of the stock a screw is tapped through its thickness, and acts against a piece of wood, which it presses

up against the iron, and thus holds it fast against the brass frame, in the same manner as the wedge of a common plane; this piece of wood is formed forked and hollowed where it applies to the iron, to allow room for the chips to come up from the mouth. The workmen who use this plane call it *stripping*, instead of planing, brass or other metal.

The metal plane is used in the same manner as a carpenter's jack plane, but as the shaving it cuts, or rather scrapes off, must be exceedingly thin, the greatest nicety is necessary in adjusting the projection of the iron beyond the face; and for this reason the screw is essential.

The work is to be supported upon a firm bench, which is best made of cast-iron, and the surface of it made perfectly flat, which is done by grinding the face of the plane against it with emery, till both are true. The front face of the iron is quite flat, and perpendicular to the face; the edge is formed at the bottom of this surface by grinding a bevel from the back at an angle of about 45 degrees; the edge is then made fine by a Turkey stone. The iron must be exceedingly hard and of the very best steel, and then the plane will cut soft steel, bell-metal, or *cast-iron*, as well as brass, to very good purpose. When the work is rough, it is difficult for a man to work the plane, if set coarse for expedition, they therefore use, in such case, an iron which is cut with flutes on the front side, and then the edge will be divided into separate teeth, which scrape and cut away with less resistance than a complete edge. Messrs. Holtzapffel and Deyerlien of Coekspur-street, make these planes for metal of exceedingly hard cast-iron, and very true faces, which do not therefore become scratched or injured by wear. It should have been mentioned before, that joiners, cabinet-makers, &c. in planing thin or valuable woods for veneering, &c. sometimes use fluted irons, having teeth in their edge; and a plane thus mounted is called a *toothing plane*; these irons apply to the stocks of different planes.

PLANE, among *Fowlers*. To plane, is to fly or hover, as a kite or other bird does, without moving its wings.

PLANE, in *Geography*, a town of America, in Stark county, and state of Ohio, containing 527 inhabitants.

PLANE-Tree, in *Botany*. See PLANTANUS.

PLANE-Tree, *Ballard or False*. See MAPLE.

PLANE-Tree, in *Planting*, the common name of an elegant tall growing tree of the timber kind, of which there are two species, as the Asiatic, or oriental, and occidental, or American; the first of which rises to a very great height, and in its native soil grows to a prodigious size; the stem is covered with a smooth bark, which falls off annually. The bark of the young branches is of a dark brown, inclining to a purple. The leaves are large and palmated, being deeply cut into five segments: their upper sides are of a deep green, and the under sides pale. The flowers are very minute: they come out at the same time as the leaves, which is in June. This, Mr. Marshall says, is very late, and is, no doubt, a blemish to the beauty of this nevertheless highly ornamental tree. The ancients were very partial to this tree; which is not to be wondered at, when the extensive canopy it forms is considered, the impenetrable shade given by the number and size of the leaves, and consequently the grateful coolness it must afford in a sultry climate. This, as well as the American sort, has been considered as a forest or timber tree; and their wood may rank with that of the yeamore, which bears a considerable resemblance to them, and which, in the north of England, is often improperly called the plane-tree.

With regard to the second sort, or American plane, it grows to a great size; the stem not only swells to an immense thickness but, rising erect, shoots up perfectly straight

straight and cylindrical to an amazing height. The bark is smooth, and, like that of the Asiatic or former sort, falls off annually. The leaves are broad, with long footstalks, and are cut into angles at their edges, but not divided nearly so deep as those of the other kind. The upper side is of a light green, the under side paler. The flowers are small, and come out with the leaves about the same time as those of the Oriental plane. Mr. Marshall thinks that, on the whole, this tree is peculiarly refreshing to the eye, and truly ornamental.

And in addition to these species, there are two varieties of the first sort, as the maple-leaved plane, and the Spanish plane, the first of which differs from the other sorts, in having its leaves not so deeply cut as those of the Eastern plane, but much more deeply than those of the occidental. The footstalks of the leaves are much larger than those of either of them, and the upper surface of the leaves is rougher. They might, of course, be taken for different species, if it was not well known that they are produced from the same seeds. The Spanish plane has larger leaves than either of the other sorts. They are divided in a similar manner to those of the maple-leaved plane. Some of them are cut into five, and others into three lobes: these are sharply indented on their edges, and are of a light green. It is by some called the middle plane, from its leaves being shaped between those of the first two sorts.

The first of these sorts may be raised from seeds, where they can be procured; but in other cases recourse must be had to layers. And the ground proper for raising them in, is such as is moist and shady, well dug, and raked until the mould is fine; then in the autumn, soon after the seeds are ripe, they should be scattered over the surface, and be raked in the same manner as turnip seed. In the spring, many of the young plants will appear, but it must not be expected that the general crop will come up until the second year; the spring after which they may be taken out of the seed-bed, and planted in a nursery-ground in rows one yard asunder, and at one foot and a half distance in the rows. Here they should remain, with the usual care of digging between the rows, and keeping them clean, till they are of sufficient size to be planted out in plantations or other places, either as timber or ornamental trees. In the layering method a sufficient number of trees must be planted out for stools, on a spot of earth double dug. After they have stood one year, they should be cut down, in order to make them throw out young wood for layering. The autumn following, these should be laid in the ground, with a little nick at the joint; and by the same time twelve months they will be trees of a yard high, with a good root, ready to be planted out in the nursery, where they may be managed as the seedlings; and as the stools will have shot up fresh young shoots for a second operation, this management may be continued as the planter may think fit.

But the American plane is mostly raised by cuttings; which, if they be taken from strong young wood, and planted early in the autumn, in a moist good mould, will hardly fail of succeeding. They are generally planted thick, and then removed into the nursery-ground, as the layers of the other sort: but if a large piece of ground was ready, Mr. Marshall thinks these might be placed at such a distance as not to approach too close before they were of a sufficient size to be planted out to stand; and this would save the expence and trouble of a removal. The Oriental plane-tree will also grow from cuttings, but not so certainly as this; and whoever has not the convenience of

proper ground for the cuttings, must have recourse to layers, which, indeed, for either sort is the most effectual and certain method of proceeding.

These sorts of trees delight in a moist situation, especially the occidental sort. Where the land is inclined to be dry, the others are to be preferred. But in moist places, by the sides of rivulets, ponds, &c. the occidental makes such surprising progress, that it might be ranked among the aquatics. The bright colour of the plane-trees gives variety to groves and masses of wood; in groups and single trees they are singularly elegant; as may be seen in many parks and other places. In such situations and soils they may likewise be planted as timber trees with great advantage, as the wood is useful for a variety of purposes.

And the proper season for planting out this sort of trees is in the early spring, as about March; but they may be set out in the autumn, where the soil is not of too wet a nature, with perfect success, though the other is always to be preferred if possible.

PLANERA, in *Botany*, so named by professor Gmelin of Gottingen, the very incompetent editor of the *Linnaean Systema Naturæ*, at least as far as the vegetable kingdom is concerned. He appears to have designed to commemorate James Planer, who published an Index of the plants about Erfurt, where he was professor of medicine. Gmelin took his ideas of the genus from Walter's *Flora Caroliniana*, 230, it being one of those which that writer had described as new, but which he had declined naming. Michaux has adopted *Planera*, *Fl. Boreal-Amer.* v. 2. 247, as has Mr. Pursh in his *Fl. Amer. Septentr.* v. 1. 115. Both remark its very near affinity to *Ulmus*. Indeed Michaux's description hardly indicates any difference, except the flowers being polygamous, which is of no generic importance whatever. Michaux defines two species; *P. Gmelini*, a native of North America, *Anonymos aquatica* of Walter; and *P. Richardi*, a native of the country near the Caspian sea. This latter has long been known in the gardens of France and England, by the name of the Siberian Elm, or *Ulmus polygama*. *Ulmus nemoralis* of both editions of Hort. Kew. always appeared to us the same thing, but Mr. Pursh has the latter as a native American *Ulmus*, though Michaux has not any species under that name, nor does he give his *Planera Richardi* as an American plant. Pallas has figured the Caspian tree, under the appellation of *Rhamnus carpiniifolius*, *Fl. Ross.* v. 1. t. 60, but he had not seen the ripe fruit. Whatever this Caspian plant may be, the *Abelicea cretica* of Pona, *Clus. Hist.* v. 2. 302, is certainly another species of the same genus, as has been shewn by the writer of the present article, in a paper on the subject of that little known plant, printed in *Tr. of the Linn. Soc.* v. 9. 126. Whether the genus in question be distinct from *Ulmus*, appears very doubtful; but if it should so prove, the name of *Planera* must give way to *Abelicea*, as a Greek name, published long since, and of good authority. See *ULMUS*, where possibly we may be able to throw some further light on this subject.

● PLANET, PLANETA, πλανήτης, *wanderer*, in opposition to a *star*, which remains fixed, in *Astronomy*, a celestial body revolving round the sun as a centre, and continually changing its position with respect to the other stars.

The planets are usually distinguished into *primary* and *secondary*.

PLANETS, *Primary*, called also simply, and by way of eminence, *planets*, are those which move round the sun as their proper centre. Such are the Georgian, Georgium Sidus or Herschel, Saturn, Jupiter, Vesta, Juno, Pallas, Ceres, Mars, the Earth, Venus, and Mercury.

# PLANET.

PLANETS, *Secondary*, are such as move round some primary planet as their respective centre, in the same manner as the primary planets do round the sun. Georgium Sidus, Saturn, Jupiter, and the Earth, are each attended with secondary planets; the Georgian with six, Jupiter with four, and Saturn with seven, called the *satellites* of those planets. The Earth has one secondary planet, called the *Moon*; which see.

The motion of the primary planets is very simple and uniform, as being compounded only of a projectile motion, forward in a right line, which is a tangent to the orbit; and a gravitation towards the sun at the centre. (See GRAVITY.) Besides, as they are at such vast distances from one another, the effects of their mutual gravitation are in a considerable degree, though not altogether, insensible; for the action of Jupiter on Saturn, *e. gr.* is found to be  $\frac{1}{100}$  of the action of the sun upon Saturn, by comparing the matter of Jupiter with that of the sun, and the square of the distance of the sun from Saturn, with the square of the distance of Jupiter from Saturn; so that the elliptic orbit of Saturn will be found to be more just, if we suppose its focus not to be in the centre of the sun, but in the centre of gravity of the sun and Jupiter, or rather, in the centre of gravity of the sun, and of all the planets below Saturn. In the same manner, the elliptic orbit of any other planet will be found more accurate, by supposing its focus to be in the centre of gravity of the sun, and of all the planets that are below it. But the matter is far otherwise in respect of the secondary planets; for every one of these, though it chiefly gravitate towards its respective primary one, as towards its centre, yet at equal distances from the sun, it is also attracted towards him with an equally accelerated gravity, as the primary one is toward him; but at a greater distance with less, and at a nearer distance with greater: from which double tendency towards the sun, and towards their own primary planets, the motion of the satellites, or secondary planets, comes to be very much compounded, and affected with many inequalities: as, for instance,

1. The satellite shall be continually accelerated in its motion, from the time of its quadrature with the sun to the next following conjunction or opposition; but contrarywise from the syzygies to the quadratures, it shall be retarded; and therefore it will always move swifter in or near the syzygies, and slower near the quadratures. From whence will follow that,

2. The orbits of these secondary planets will be of a figure more circular in the quadratures than in the syzygies, where the swiftness of the motion will make the figure of the orbit more rectilinear, and therefore the satellite will run farther from its primary planet at the quadratures than at the syzygies; so that the orbit will be a little elliptical, having the primary planet for its centre, and the longer diameter will coincide with the line of the quadratures, and the shorter with that of the syzygies. Which irregularities will arise, if the sun's power of disturbing the motion of the satellite be excluded, and the orbit be concentric with that of the primary planets: for if the orbit be excentric, it may happen that the satellite shall be farther off from the primary one in the syzygies, and so move slower than it does at the quadratures; and when this is the case, that the satellite's orbit is not a circle concentric to the primary orbit, but an ellipse, in one of whose focuses the primary planet is placed, then the motion of the satellite will be so disturbed by the sun, that, as it proceeds in its orbit, the apfides of the orbit will be moved sometimes *in consequentia*, and sometimes *in antecedentia* (whereas the nodes and

apfides of the primary planets may be considered as at rest.)

3. When the plane of the satellite's orbit is inclined to the plane of the primary orbit, the line of the nodes of the secondary orbit will be moved *in antecedentia*, with an angular motion, and an unequal velocity; for it will recede most swiftly when the nodes are in quadrature to the sun; after which it will move slower; and at the time of the nodes being in the syzygies, it will be perfectly at rest.

4. The inclination also of the plane of the secondary orbit, to the primary one, will be continually varying, and will be greatest when the nodes are in the syzygies with the sun, and less, *ceteris paribus*, when they are in the quadratures; and from the time of the nodes being in the syzygies to the quadratures, it will be always decreasing, and from the time of their being in the quadratures to the syzygies, it will be always increasing; and all these irregularities, whether in any excentric or concentric orbit, will always be something greater, when the satellite is in conjunction with the sun, than when he is in opposition to him. See MOON and SATELLITES.

The primary planets are in number eleven, (including the earth) ten of which are again distinguished into the *superior* and *inferior*.

PLANETS, *Superior*, are those farther from the sun than our earth is. Such are Mars, Vesta, Juno, Pallas, Ceres, Jupiter, Saturn, and the Georgian.

PLANETS, *Inferior*, are those nearer the sun than our earth, and situate between the earth and sun. Such are Venus and Mercury. See the order, position, &c. of the planets, under *Copernican SYSTEM*.

The planets are represented by the same characters as the chemists use to represent their metals by, on account of some supposed analogy between those celestial and subterraneous bodies.

The Georgian is represented by the character ♃, and performs its sidereal revolution in about 84 years.

According to La Place, the first five satellites of this planet may be retained in their orbit by the action of its equator, and the sixth by the action of the interior satellites; and hence he concludes, that this planet revolves about an axis very little inclined to the ecliptic, and that the time of its diurnal rotation cannot be much less than that of Jupiter or Saturn. When the Earth is in its perihelion, and the Georgium Sidus in its aphelion, the latter becomes stationary, when his elongation or distance from the sun is  $8^{\circ} 17' 37''$ , and his retrogradations continue  $151^{\text{d}} 12^{\text{h}}$ . When the Earth is in its aphelion, and the Georgium Sidus in its perihelion, it becomes stationary at an elongation of  $8^{\circ} 16' 27''$ , and the retrogradations continue  $149^{\text{d}} 18^{\text{h}}$ . The following table contains the most correct elements of the orbit of the Georgium Sidus, and other particulars relating to this planet.

Tropical revolution	30589 <sup>d</sup> 8 <sup>h</sup> 27 <sup>m</sup>
Mean distance from the Sun, that of the	190835 <sup>z</sup>
Earth being 100000	}
Density, that of water being 1	0 <sup>99</sup> / <sub>1000</sub>
Quantity of matter, that of the Earth being 1	16.84
Diameter in English miles	35112
Inclination of its orbit in 1780	46' 20"
Place of aphelion in 1800	11 <sup>s</sup> 16' 30' 31"
Secular motion of aphelion	0 1 29 2
Excentricity of its orbit, the mean distance being 100000	} 90804
Longitude for 1784	3 <sup>s</sup> 14' 43' 18"
Greatest equation of the centre	0 5 27 16
4 A	Longitude

## PLANET.

Longitude of ascending node in 1788	2° 12' 47" 0"	
Secular motion of the node	1 44 35	
Greatest aberration	25	

See GEORGIUM SIDUS, and *Planetary NUMBERS*.

The planet Ceres, first discovered by Piazzi, January 6, 1801, and afterwards by Dr. Olbers of Bremen, Jan. 1, 1807, nearly in the place where it was expected to appear from the calculations of Baron Zach, is of a ruddy colour, and seems to be about the size of a star of the eighth magnitude; apparently surrounded by a dense atmosphere, and plainly exhibiting a disc, when examined with a magnifying power of about 200. Its revolution round the sun is performed in four years, seven months, and ten days; at a mean distance of nearly 260 millions of English miles. The eccentricity of its orbit is somewhat greater than that of Mercury, and its inclination to the ecliptic exceeds that of all the old planets. According to Dr. Herschel, its diameter does not exceed 160 miles, whereas Mr. Schroeter makes it 1624 miles. The following table comprehends all the particulars that are known concerning it.

Tropical revolution, La Lande	4 <sup>y</sup> 7 <sup>m</sup> 10 <sup>d</sup>	
Do. from Maskelyne's Table,	1681 <sup>d</sup> 12 <sup>h</sup> 9'	
Annual motion	2° 18' 14" 0"	
Mean longitude, January 1, 1804	10 11 59 0	
Place of ascending node, from Maskelyne's Table, in 1802	2 20 58 40	}
Do. in 1804, according to La Lande	2 21 6 0	
Place of aphelion in 1802	4 25 57 15	
Do. according to La Lande, Jan. 1, 1804	4 4 26 44	
Excentricity, the mean distance being 1,	0.08141	}
according to Maskelyne	0.079	
Do. according to La Lande	10° 37' 0"	
Inclination of orbit	9 20 8	
Greatest equation of centre, Maskelyne	9 3 0	
-----, La Lande	- 2.77	}
Mean distance from the Sun, that of the Sun from the Earth being 1, La Lande	2.735	
Do. from Maskelyne's Table	260.000.000	
Mean distance in English miles	163	
Diameter in English miles, Herschel	1624	
-----, Schroeter	1"	}
Apparent mean diameter, as seen from the Earth		

See CERES, and *Planetary NUMBERS*.

For an account of the planet Pallas, see PALLAS, and *Planetary NUMBERS*.

Juno, a planet discovered, as we have said under JUNO, in 1804, is of a reddish colour, and free from that nebosity which surrounds Pallas. Its diameter is less, and its distance greater than those of the other new planets. It is distinguished from all the other planets by the great eccentricity of its orbit; and the effect of this is so extremely sensible, that it passes over that half of its orbit, which is bisected by its perihelion, in half the time that it employs in describing the other half, which is farther from the sun. From the same cause, its greatest distance from the sun is double the least distance, the difference between the two distances being about 127 millions of miles. The following elements were calculated by Burekhardt.

Revolution	5 <sup>y</sup> 182 <sup>d</sup>	
According to others (see <i>Planetary NUMBERS</i> ) in	1590 <sup>d</sup> 1 35'	}
Mean longitude, 31st December, 1804, noon,	1° 12' 17" 23"	
Place of ascending node	5 21 6 0	
Place of perihelion in 1805	1 29 49 33	

Excentricity, the mean distance being	100.000	
Inclination of orbit	21° 0' 0"	}
Mean distance from the Sun in English miles	275.000.000	
Diameter in English miles, according to Schroeter	1425	
Apparent mean diameter, as seen from the Earth, according to Schroeter	3".057	}
See JUNO.		

Dr. Olbers, who had distinguished himself by the discovery of two of the new planets, conceived, that these small celestial bodies were merely the fragments of a larger planet, which had been burst asunder by some internal convulsion, and that several more might be discovered between the orbits of Mars and Jupiter. He therefore concluded, that though the orbits of all these fragments might be differently inclined to the ecliptic, yet, as they must have all diverged from the same point, they ought to have two common points of reunion, or two nodes in opposite regions of the heavens, through which all the planetary fragments must sooner or later pass. One of these nodes Dr. Olbers found to be in Virgo, and the other in the Whale, and it was actually in the latter of these regions that Mr. Harding discovered the planet Juno. With the intention therefore of detecting other fragments of the supposed planet, Dr. Olbers examined, thrice every year, all the little stars in the opposite constellations of the Virgin and the Whale, till his labours were crowned with success on the 29th of March, 1807, by the discovery of a new planet in the constellation Virgo, to which he gave the name of Vesta. This planet was observed at Blackheath the 26th of April, 1807, by S. Groombridge, esq., an ingenious and active astronomer; and pursuing his observations with persevering attention and industry, he at length, viz. on the 8th of September, 1808, observed the ecliptic opposition of this planet at 7<sup>h</sup> 30' in longitude 115° 15' 54" 26".

The planet Vesta is of the fifth or sixth magnitude, and may be seen in a clear evening by the naked eye. Its light is more intense, pure, and white than any of the other three. It is not surrounded with any nebosity, and has no visible disc. (Phil. Transf. 1807, part ii. p. 265. 260.) The orbit of Vesta cuts the orbit of Pallas, but not in the same place where it is cut by that of Ceres. According to the observations of Schroeter, the apparent diameter of Vesta is only 0.488 of a second, one half of what he found to be the apparent diameter of the fourth satellite of Saturn; and yet it is very remarkable, that its light is so intense, that Mr. Schroeter saw it several times with his naked eye. Phil. Transf. 1807, part ii. p. 245.

M. Burekhardt is of opinion, that Le Monnier had observed this planet as a fixed star, since a small star, situated in the same place, and observed by that astronomer, has since disappeared.

The following are the elements of the orbit of Vesta, computed by Mr. Groombridge, from his own observations.

Revolution	3 <sup>y</sup> 182	
According to others (see <i>Planetary NUMBERS</i> ) in	1335 <sup>d</sup> 0 <sup>h</sup> 23'	}
Place of aphelion	6° 3' 0' 0"	
Place of ascending node	3 14 38 0	
Inclination of orbit	7 8 20	
Mean distance	2.163	
Excentricity in parts of the Earth's radius	0.0953	

The following elements are given by Burekhardt, in the *Connoissance de Temps* for 1809, from the most recent observations on the continent.

Place

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Place of ascending node	-	-	3°	13'	1"	0"
Place of perihelion	-	-	8	9	42	53
Inclination of orbit	-	-	7	8	46	
Mean distance	-	-	2.373000			
Excentricity	-	-	0.093221			

We shall subjoin to the account above given of the four new planets, called by Dr. Herschel *asteroids* (which see), some observations concerning their origin. From a variety of considerations it has been concluded, agreeably to the opinion suggested by Dr. Olbers, that these four planets are the fragments of a large celestial body, which once existed between Mars and Jupiter. On the supposition that they are independent planets, their diminutive size, the great excentricity and inclination of their orbits, and their numerous intersections, when projected on the plane of the ecliptic, are phenomena absolutely inexplicable on every principle of science, and completely subversive of that harmony and order, which, before the discovery of these bodies, pervaded the planetary system. But if we admit the hypothesis, that these planets are the remains of a larger body, which circulated round the sun, nearly in the orbit of the greatest fragment, the system resumes its order, and we discover a regular progression in the distances of the planets, and a general harmony in the form and position of their orbits. Thus does the ingenious Dr. Brewster introduce his general reasoning on this subject. He then proceeds to observe, that the elements of the new planets furnish us with several direct arguments, drawn from the excentricity and inclination of their orbits, and from the position of their perihelia and nodes, and all concurring to shew, that the four new planets have diverged from one point of space, and have, therefore, been originally combined in a larger body. When the original planet burst in pieces, by some internal force capable of overcoming the mutual attraction of the fragments, the larger fragment must obviously receive the least impetus from the explosive force, and circulate in an orbit deviating less than any other of the fragments from the original path of the large planet; while the lesser fragments, being thrown off with greater velocity, would revolve in orbits more excentric, and more inclined to the ecliptic. Applying this remark to the case before us, the excentricity of Ceres and Vesta is nearly one-twelfth of their mean distance, that of Ceres being rather the greatest; and the excentricity of Pallas and Juno is one-fourth of their mean distance, that of Pallas being a little greater than that of Juno. From the theory it might be expected, that Pallas and Juno would be considerably smaller than Ceres and Vesta, and that Ceres should be the larger fragment, and have an orbit more analogous in excentricity and inclination than any of the smaller fragments to the other planets of the system. As far as the diameters of the new planets have been measured, the theory is very strikingly confirmed by observation. According to Dr. Herschel, the diameter of Ceres is 163 miles, while that of Pallas is only 80. The observations of Schroeter make Juno considerably less than Ceres; and though the diameter of Vesta has not been accurately ascertained, yet the intensity of its light, and the circumstance of its being distinctly visible to the naked eye, are strong proofs that it exceeds in magnitude both Pallas and Juno. The striking resemblance between the two lesser fragments, Pallas and Juno, in their magnitudes, and in the extreme excentricity of their orbits, would lead us to anticipate similar resemblances in the position of their nodes, in the place of their perihelia, and in the inclination of their orbits; while the elements of Ceres and Vesta should exhibit similar coincidences. Now, the inclination of Ceres is 10°, and that of Vesta 7°; while the inclination of Juno is 21°,

and that of Pallas 34°; the two greater fragments having nearly the same inclination, and keeping near the ecliptic, while the lesser fragments diverge from the original path, and rise to a great height above the ecliptic, and far above the orbits of all the other planets in the system. If it shall be found, from observation, that Vesta is one of the smaller fragments, we may then account for its position with regard to Ceres, and for the small inclination and excentricity of its orbit, by supposing the planets Ceres, Pallas, and Juno, to have diverged in the same plane, and nearly at right angles to the ecliptic, while Vesta diverged from the direction of the original planet, in a plane parallel with the ecliptic. This opinion is strongly confirmed by the fact, that the orbit of Vesta is nearer to the sun than either of the orbits of the other three fragments. The same coincidence is apparent in the position of the nodes. The orbits of Pallas and Juno cut the ecliptic in the same point, and the nodes of Ceres and Vesta are not far distant. If all the fragments of the original planet had, after the explosion, been attracted to the larger fragment, it is obvious that they would all move in the same orbit, and consequently have the same perihelion. If the fragments received a slight degree of divergency from the explosive force, and moved in separate orbits, the points of their perihelion would not coincide, and their separation would increase with the divergency of the fragments. But, since all the fragments partook of the motion of the primitive planet, the angle of divergency could never be very great; and, therefore, we should expect that all the perihelia of the new planets would be in the same quarter of the heavens. This theoretical deduction is most wonderfully confirmed by observation. These singular resemblances, as our author closes his reasoning on this subject, in the motions of the greater fragments, and in those of the lesser fragments, and the striking coincidences between theory and observation in the excentricity of their orbits, in their inclination to the ecliptic, in the position of their nodes, and in the places of their perihelia, are phenomena which could not possibly result from chance, and which concur to prove, with an evidence amounting almost to demonstration, that the four new planets have diverged from one common node, and have therefore composed a single planet. Our author proceeds to account for the origin of meteoric stones, which he considers as phenomena that might accompany this great convulsion. Ferguson's *Astronomy*, by Dr. Brewster, vol. ii. See *BALLS of Fire*, *FALLING Stones*, and *GEORGIUM SIDUS*.

Saturn is represented by the character ♄. This planet, on account of its great distance, appears to the eye with a feeble light. It performs its revolution round the sun in about thirty years. See SATURN.

Jupiter, marked ♃, is a bright resplendent star, finishing its course round the sun in about twelve years. See JUPITER.

Vesta has no character assigned it. See VESTA.

Juno is represented by the character ♃. See JUNO.

Pallas is exhibited under the character ♃. See PALLAS.

Ceres is marked by ♃. See CERES.

Mars, characterized ♃, is a ruddy fiery-coloured planet, finishing its course in about two years. See MARS.

The Earth, marked ⊕, performs its revolution in one year. See EARTH.

Venus, ♀, is the brightest of all the planets, constantly attending the sun, and never distant from him above 48 degrees. It finishes its course in about seven months.

When it goes before the sun, it is called *Phosphorus* and *Lucifer*; and when it follows him, *Hesperus*.

Mercury, ☿, a little bright planet, the sun's constant companion, from whose side it never departs above 28 degrees, and by that means is usually hid in his splendour.

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It performs its course in about three months. See **MERCURY**.

From these definitions, a person may easily distinguish all the planets. For, if after sun-set he sees a planet nearer the east than the west, he may conclude it is neither Mercury nor Venus; and may determine whether it is Saturn, Jupiter, or Mars, by the colour and light: by which also he may distinguish between Mercury and Venus.

**PLANETS, Nature of the.** From the several phases and appearances of the planets, they are found to be all like the moon, which we have shewn to be like our earth; whence it follows, that the planets are also dark, opaque, spherical, &c. bodies, like our earth.

This may be shewn almost to a demonstration.

The phases of Mercury are easily distinguished to be like those of Venus; but no spots have yet been discovered, by which we can ascertain whether it has any rotation. Although Dr. Herschel affirms, in consequence of his observations of this planet, that it appears equally luminous in every part of its body, and that its disc is always well defined, without any spot or ragged edge, Mr. Schroeter thinks that he has discovered not only spots, but mountains in Mercury. He measured two of these mountains, the highest of which was 8900 toises, or  $10\frac{3}{4}$  miles, or more than double the height of Chimboraco in the Andes; and the other was little more than 1000 toises high. From the variations in the daily appearance of Mercury's horns, this astronomer infers that the period of its daily rotation was  $24^h 5' 28''$ . These observations remain to be confirmed.

Venus, observed with a telescope, is rarely found full, but with variable phases like those of the moon; her illuminated part still turned towards the sun, *viz.* towards the east when she is the morning-star, and towards the west when the evening-star.

The phases of Venus were first discovered in 1611 by Galileo, who sent an account of the discovery to William de Medici, in order to have it communicated to Kepler. He transmitted it in this cypher, "Hæc immature a me frustra leguntur, o.7;" which, duly arranged, is "Cynthiæ figuræ æmulatur mater amorum," *i. e.* Venus emulates the phases of the moon. Afterwards he wrote a letter to him, giving an account of the discovery, and explaining the cypher. In 1666, M. Cassini, at a time when Venus was dichotomized, discovered a bright spot upon it at the straight edge, like some of the bright spots upon the moon's surface; and by observing its motion, which was upon the edge, he found the sidereal time of rotation to be  $23^h 16'$ . In the year 1726, Bianchini made some observations upon the spots of Venus, and asserted that the time of rotation was  $24\frac{1}{2}$  days; that the north pole answered to the 20th degree of Aquarius, and was elevated from  $15^\circ$  to  $20^\circ$  above its orbit; and that the axis continued parallel to itself. M. Cassini, the son, vindicated his father's observations, and took occasion, from the interruption of Bianchini's observations, to shew that she might easily mistake different spots for the same; and he concludes, that if we suppose the time of rotation to be  $23^h 20'$ , it agrees equally with their observations; but if we take it to be  $24\frac{1}{2}$  days, it will not at all agree with his father's observations. M. Schroeter has endeavoured to shew that Venus has an atmosphere, from observing that the illuminated limb, when horned, exceeds a semicircle; and this he supposes to arise from the refraction of the sun's rays through the atmosphere of Venus at the cusps, by which they appear prolonged. The cusps appeared sometimes to run  $15^\circ 19'$  into the dark hemisphere; from which he computes, that the height of the atmosphere, for refracting such a quantity of light, must be 15,156 Paris feet; but this must depend on the nature and density of the atmosphere, of

which we are ignorant. (See Phil. Transf. for 1792.) He makes the time of rotation to be  $23^h 21'$ ; and concludes, from his observations, that there are considerable mountains upon this planet.

He found that, like those of Mercury and of the moon, those of the southern hemisphere were the highest; their perpendicular heights being nearly as the diameters of their respective planets. M. Schroeter measured the height of four mountains in Venus, and obtained the following results; *viz.*

	Toises.	Miles.
1st Highest	- 18900	22.05
2d Highest	- 15750	18.97
3d Highest	- 9500	11.44
4th Highest	- 9000	10.84

This planet has generally been considered as about 220 miles less in diameter than the earth; but from the measurements of Dr. Herschel, whose accuracy cannot be questioned, it is inferred that when reduced to the mean distance of the earth, her apparent mean diameter is  $18''.79$ , that of the earth being  $17''.2$ , that is, 8648 English miles, the diameter of the earth being 7912. Phil. Transf. for 1795. See **VENUS**.

M. de la Hire, in 1700, with a telescope of sixteen feet, discovered mountains in Venus, larger than those of the moon.

Dr. Herschel agrees with M. Schroeter in supposing that Venus has a considerable atmosphere; but he has not made any observations by which he can determine either the time of rotation, or the position of the axis. See Phil. Transf. for 1793.

Gassendus first, and after him others, have observed Mercury on the face of the sun, across which he appeared to pass like a black round spot. Horrox, in 1639, also observed Venus in the sun, where she made the same appearance. Two transits have been since observed, and those of Mercury are more frequent. See **PARALLAX** and **TRANSIT**.

Galileo discovered the phases of Mars; after which some Italians, in 1636, had an imperfect view of a spot. But in 1666 Dr. Hooke and M. Cassini discovered some well defined spots, observed likewise by Campani; and Cassini determined the time of the rotation to be  $24^h 40'$ . Soon after, M. Maraldi observed some spots, and determined the time of rotation to be  $24^h 39'$ . He also observed a very bright part near the southern pole, apparently like a polar zone; this, he says, has been observed for 60 years; it is not of equal brightness; more than half of it being brighter than the rest; and that part which is least bright is subject to great changes, and sometimes disappears. Something of the same kind has been observed about the north pole. The rotation is according to the order of the signs. Dr. Herschel makes the time of a sidereal revolution to be  $24^h 39' 21''.67$ , without the probability of a greater error than  $2''.34$ . He proposes to find the time of a sidereal rotation, in order to discover, by future observations, whether there is any alteration in the time of the revolution of the earth, or of the planets, about their axes; for a change of either would be thus discovered. He chose Mars, because its spots are permanent. (See Phil. Transf. for 1781.) From farther observations upon Mars, which he published in Phil. Transf. for 1784, he makes its axis to be inclined to the ecliptic  $59^\circ 42'$ , and  $61^\circ 18'$  to its orbit; and the north pole to be directed to  $17^\circ 47'$  of Pisces upon the ecliptic, and  $19^\circ 28'$  on its orbit. He makes the ratio of the diameters of Mars to be as 16 to 15. Dr. Maskelyne has carefully observed Mars at the time of opposition, but could not perceive any difference in its diameters. Dr. Herschel observes, that Mars has a considerable atmosphere, the density of which occasions the redness of its light. La Place has computed the density of this planet to be  $\frac{3}{4}$ ths that of the earth. See **MARS**.

Jupiter is observed to have belts, and also spots, by which the time of its rotation can be more accurately ascertained:

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tained. These belts were first observed by two Jesuits, Zuppi and Bartoli. They were afterwards examined in 1633 by Fontana, Rheita, Riccioli, Grimaldi and Campani. M. Cassini found the time of rotation to be  $9^h 56'$ , from a remarkable spot which he observed in 1665. In October, 1691, he observed two bright spots, almost as broad as the belts; and at the end of the month he saw two more, and found them to revolve in  $9^h 51'$ ; he also observed some other spots near Jupiter's equator, which revolved in  $9^h 50'$ ; and, in general, he found that the nearer the spots were to the equator, the quicker they revolved. It is, therefore, probable, that the spots are not upon Jupiter's surface, but in its atmosphere; and for this reason also, that several spots, which appeared round at first, grew oblong by degrees, in a direction parallel to the belts, and divided themselves into two or three spots. M. Maraldi, from a great many observations of the spot observed by Cassini in 1665, found the time of rotation to be  $9^h 56'$ : and concluded that the spots had a dependence upon the contiguous belt, as the spot had never appeared without the belt, though the belt had been seen without the spot. It continued to appear and disappear, until the year 1694, and was not seen any more until the year 1708; hence he concluded, that the spot was some effusion from the belt upon a fixed place of Jupiter's body: for it always appeared in the same place. Dr. Herschel found the time of rotation of different spots to vary; and that the time of rotation of the same spots diminished, for the spot observed in 1788 revolved as follows. From February the 25th to March the 2d, in  $9^h 55' 20''$ ; from March the 2d to the 14th, in  $9^h 54' 58''$ ; from April the 7th to the 12th, in  $9^h 51' 35''$ . Also, from a spot observed in 1779, its rotation was, from April the 14th to the 19th, in  $9^h 51' 45''$ ; from April the 19th to the 23d., in  $9^h 50' 48''$ . This, he observes, is agreeable to the theory of equinoctial winds, as it may be some time before the spot can acquire the velocity of the wind; and if Jupiter's spots should be observed in different parts of its revolution to be accelerated and retarded, it would amount almost to a demonstration of its monsoons, and their periodical changes. M. Schroeter makes the time of rotation  $9^h 55' 36''.6$ ; and he observed the same variations with those of Dr. Herschel. The rotation is according to the order of the signs. This planet is observed to be flat at its poles. Dr. Pound measured the polar and equatorial diameters, and found them to be as 12 to 13. Mr. Short made them as 13 to 14. Dr. Bradley made them as 12.5 to 13.5. Sir Isaac Newton makes the ratio  $9\frac{1}{2}$  to  $10\frac{1}{2}$  by theory. The belts of Jupiter are generally parallel to its equator, which is very nearly parallel to the ecliptic: they are subject to great variations, in respect both to their number and figure: sometimes eight have been seen at once, and at other times only one; sometimes they continue for three months without any variation, and sometimes a new belt has been formed in an hour or two. From their being subject to such changes, it is very probable that they do not adhere to the body of Jupiter, but exist in its atmosphere. Others, however, imagine that they are of a more permanent nature, and that they indicate great physical revolutions, which are perpetually agitating and changing the surface of the planet. It is suggested by Dr. Brewster (Ferguson's Astronomy, vol. ii.) that the spot first observed by Cassini, already mentioned, could not possibly be occasioned by any atmospheric variations; and that its disappearance for five years, between 1708 and 1713, affords a presumptive, though not a decisive argument, that it arose from some changes in the body of the planet. He inclines to think, that from the frequent appearance of this spot, it is permanent upon the body of Jupiter, and that its disappearance is owing to the interposition of clouds in the atmo-

sphere of the planet. He farther intimates, that the clouds of Jupiter, partaking of the great velocity of its diurnal motion, are formed into strata parallel with the equator; that the body of Jupiter reflects less light than the clouds; and that the belts are nothing more than the body of the planet seen through the parallel interstices which lie between the different strata of clouds. The permanent spot of Cassini will, of course, only be seen when it is immediately below one of these interstices, and will therefore always appear as if it accompanied one of the belts. See JUPITER and SATELLITES.

Saturn was suspected by Cassini and Fatio, in 1683, to have a revolution about its axis, for they one day saw a bright streak, which disappeared the next, when another came into view near the edge of its disc: these streaks are called "belts." In 1719, when the ring disappeared, Cassini saw its shadow upon the body of the planet, and a belt on each side parallel to the shadow. When the ring was visible, he perceived the curvature of the belts was such as agreed with the elevation of the eye above the plane of the ring. He considered them as similar to our clouds floating in the air; and having a curvature similar to the exterior circumference of the ring, he concluded that they ought to be nearly at the same distance from the planet, and that consequently the atmosphere of Saturn extended to the ring. Huygens observed five belts, which were nearly parallel to the equator. Dr. Herschel found that the arrangement of the belts always followed the direction of the ring: thus, as the ring opened, the belts began to shew an incurvature answering to it. And during his observations on June the 19th, 20th, and 21st, in the year 1780, he saw the same spot in three different situations. He conjectured, therefore, that Saturn revolved about an axis perpendicular to the plane of its ring. Another argument in support of this is, that the planet is an oblate spheroid, having the diameter in the direction of the ring to the diameter perpendicular to it, as about 11 to 10, according to Dr. Herschel; the measures were taken with a wire micrometer, prefixed to his 20-foot reflector. The truth of his conjecture he has now verified, having determined that Saturn revolves about its axis in  $10^h 16' 0''.44$ . (See Phil. Transf. for 1794.) La Place had formerly found that the interior ring ought to perform its revolution in ten hours. (Mem. Acad. 1787.) The rotation is according to the order of the signs.

In 1789 Dr. Herschel measured the diameter of this planet, and found that the equatorial diameter was  $22''.8$ , and the polar diameter  $20''.6$ ; which gives the proportion nearly of 10 to 11. But from more recent observations, he inferred that the polar is to the equatorial diameter as 32 to 35, or as 11 to 12 nearly. Until the year 1805 Dr. Herschel had always regarded Saturn as an accurate spheroid, but in April of that year he was struck with a very singular appearance exhibited by the planet. The flattening at the poles did not seem to begin till a very high latitude; so that the real figure of the planet resembled a square, or rather a parallelogram, with the four corners rounded off deeply, but not so much as to bring it to a spheroid. (See Phil. Transf. for 1805.) The following are the proportional dimensions of Saturn's disc.

Diameter of the greatest curvature	-	36
Equatorial diameter	-	35
Polar diameter	-	32
Latitude of the longest diameter	-	$43^{\circ} 20'$

See RING and SATURN.

The Georgian planet is at so great a distance, that astronomers with their best telescopes, have not been able to discover whether or not it has any revolution about its axis. Since the Sun (see SUN), Moon (see MOON), Saturn, Jupiter, Mars, the Earth, and Venus, are found to revolve

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on their axes, *i. e.* to have a diurnal rotation, we may argue from analogy that Mercury and the Georgian have the same; although the proximity of the former to the sun, and the great distance of the latter prevent any spots from being observed in them, by which that rotation might be demonstrated.

Moreover, in the year 1609, were first observed the little stars or moons, moving about Jupiter, by Sim. Marius; and in 1610 the same were observed by Galileo: these are now frequently observed to disappear in a clear sky, when Jupiter happens to be diametrically interposed between them and the sun. Whence it appears that they are void of light, at such time when the sun's rays, intercepted by Jupiter, cannot be propagated to them in right lines; and hence also that, like the moon, they are opaque bodies illuminated by the sun; and hence again, since Jupiter does not illuminate his satellites when placed behind him, he himself, in that part turned from the sun, may be argued to be void of light.

When Jupiter's moons are diametrically interposed between Jupiter and the sun, there is seen a round spot on Jupiter's disk, which is sometimes larger than the satellite itself. Whence it appears, that the satellites are opaque bodies, illuminated by the sun; that they project a shadow from the sun; and that the round spots, seen in Jupiter, are the shadows of the satellites.

Whence, also, the intersection of that shadow being found to be a circle, the shadow must be conical; and therefore the figure of the satellites, at least as to sense, is spherical.

The earth being between Jupiter and the sun; if, at the same time, any one of the satellites happen to be between Jupiter and the sun, it is lost in Jupiter's light; though sometimes appearing like a black spot. This phenomenon has been frequently observed by Cassini and Maraldi who have likewise noted very considerable alterations in the apparent magnitudes of the satellites; for which no reason could be given from the distance of Jupiter, the sun, or the earth: *e. gr.* that the fourth, which is usually seen the smallest, is sometimes the largest; and the third, which is usually the largest, appears sometimes the smallest. Hence, as the satellites are illuminated by the sun, even when immersed in Jupiter's light, yet do appear obscure, there must be some alteration in their atmospheres, to prevent the sun's rays being equally reflected from every part of their surface; which must likewise be the cause why their shadow is sometimes larger than themselves. See **SATELLITES**.

Now, to sum up the evidence resulting from the preceding detail of observations: 1. Since in Venus, Mercury, and Mars, only that part of the disc illuminated by the sun, is found to shine; and, again, Venus, and Mercury, when between the earth and the sun, appear like dark spots, or maculae, on the sun's disc, it is evident, that Mars, Jupiter, and Mercury, are opaque bodies, illuminated with the borrowed light of the sun. And the same appears of Jupiter, from its being void of light in that part to which the shadow of the satellites reaches, as well as in that part turned from the sun; and that his satellites are opaque, and reflect the sun's light, is also abundantly shewn. Wherefore, since Saturn, with his ring and satellites, do only yield a faint light, fainter considerably than that of the fixed stars, though these be vastly more remote, and than that of the rest of the planets, it is past doubt, that he too, with his attendants, are opaque bodies.

Since the sun's light is not transmitted through Mercury and Venus, when placed against him, it is plain they are dense opaque bodies; which is likewise evident in Jupiter, from his hiding the satellites in his shadow; and therefore, by analogy, the same may be concluded of Saturn.

From the variable spots in Venus, Mars, and Jupiter, some have concluded that those planets have a changeable

atmosphere; which changeable atmosphere may, by a like argument, be inferred of the satellites of Jupiter; and therefore, by similitude, the same may be concluded of the other planets.

In like manner, from the mountains observed in Venus, the same may be supposed in the other planets.

Since then Saturn, Jupiter, the satellites of both, Mars, Venus, and Mercury, are opaque bodies, shining with the sun's borrowed light, and are furnished with mountains, and encompassed, as some have supposed, with a changeable atmosphere, they have, of consequence, waters, seas, &c. as well as dry land, and they are bodies, therefore, like the earth. Q. E. D.

And hence nothing hinders but that the planets may also be concluded to be inhabited. Huygens, in his *Cosmotheoros*, argues very plausibly for the existence of planetary inhabitants, from the similitude of the planets with our earth: those, like this, being opaque, dense, uneven, round, heavy, illuminated, and warmed by the sun, having night and day, summer and winter, &c.

Wolffius deduces something relating to this purpose from arguments of another kind. Thus, *e. gr.* it is scarcely to be doubted, that the inhabitants of Jupiter are much larger than those of the earth, and, in effect, of the giant kind. For it is shewn in optics, that the pupil of the eye dilates in a strong light, and contracts in a weak one: wherefore, since in Jupiter the sun's meridian light is much feebler than on the earth, on account of Jupiter's greater distance from the sun, the pupil will need to be much more dilatate in the inhabitants of Jupiter than in those of the earth. But the pupil is observed to have a constant proportion to the ball of the eye, and the eye to the rest of the body; so that in animals, the larger the pupil the larger the eye, and the larger the body.

To ascertain the size of these jovial inhabitants, it may be observed, that the distance of Jupiter from the sun is to the earth's distance from the same, as 28 to 5; the intensity of the sun's light in Jupiter is to its intensity on the earth, in a duplicate ratio of 5 to 28; but it is found by experience, that the pupil dilates in a ratio greater than that in which the intensity of light decreases; otherwise a body at a great distance might be seen as clearly as a nearer; the diameter, therefore, of the pupil in its greatest dilatation, in the earth, is to its diameter in the like state in Jupiter, in a ratio greater than that of the duplicate of 5 to 28. If then we put it as 10 to 28, or as 5 to 14: since the ordinary stature of the inhabitants of the earth is computed at 5 English feet 4 inches and  $\frac{1}{2}$ ths, (which Wolffius tells us was his own height,) the ordinary stature of Jupiter's inhabitants will be found about 14 feet  $\frac{3}{4}$ ds, which is very nearly the size of the giant Og, mentioned by Moses, whose iron bed was nine cubits long, and its breadth four. But arguments of this kind being more whimsical than solid, are needless, in order to justify the similarity of the other planets to our earth, and a conjecture, that they are destined by the Creator for the same purpose.

For an account of the relative and real magnitudes, the proportional and actual distances, annual and diurnal revolutions, &c. of the planets, both primary and secondary, see **SUN**, **Solar SYSTEM**, **MOON**, **SATELLITES**, each planet under its proper name, and the references in the sequel of this article.

The quantities of matter in the Sun, Jupiter, Saturn, and the Earth, as determined by the Newtonian theory of gravity, are to each other as the numbers 1, 1087, 1077, 107787; and their densities as the numbers 100, 94 $\frac{1}{2}$ , 67, and 400; and their attractive powers at their surfaces as the numbers 10,000, 943, 529, 435, respectively. For a more correct statement, see **DENSITY**.

For

## PLANET.

For the places and motion of the aphelia of the planets, and the method of determining them, see APHELION.

For the diameters of the sun and planets, as seen from the earth, and the diameters of the planets, as seen from the sun, see DIAMETER.

For the relative mean distances of the planets from the sun, see DISTANCE.

The greatest equations of the planets are as follow: Mercury,  $23^{\circ} 40' 0''$ ; Venus  $0^{\circ} 47' 20''$ ; the Earth,  $1^{\circ} 55' 36''.5$ ; Mars,  $10^{\circ} 40' 40''$ ; Jupiter,  $5^{\circ} 30' 38''.3$ ; Saturn,  $6^{\circ} 26' 42''$ ; the Georgian,  $5^{\circ} 27' 16''$ . See EQUATION.

The following table exhibits the relation of the densities, diameters, quantities of matter, and gravity on the surfaces of the sun and planets, respectively.

Planets.	Densities.	Diameters.	Quantities of Matter.	Gravity on Surfaces.
Sun	0.25226	109.8	333928	27.7
Mercury	2.5833	0.4	0.16536	1.0333
Venus	1.024	0.9543	0.88993	0.9771
Earth	1	1	1	1
Mars	0.6563	0.5109	0.08752	0.3355
Jupiter	0.20093	11.59	312.101	2.3287
Saturn	0.10349	9.812	97.762	1.0154
Georgian	0.21805	4.258	16.837	0.9285
Moon	0.6149	0.2727	0.01245	0.1677

The intensities of light and heat which the planets receive from the sun, vary inversely as the squares of their distances from the sun: and the apparent diameter of a body is inversely as its distance; and therefore assuming the mean diameter of the sun = 32', we shall have his apparent diameter at the several planets as follows.

The following table exhibits the relative intensities of light and heat at the different planets, and the apparent diameter of the Sun seen from them.

Planets.	Intensities of Light and Heat.	Apparent Diameter of the Sun.
Mercury	6.25	80'
Venus	2.04	45.7
Earth	1	32
Mars	0.44375	21.33
Jupiter	0.036875	6.15
Saturn	0.01106	3.37
Georgian	0.00276	1.64

The orbits of the planets are all ellipses; one of whose foci is in the sun. This Kepler first found from Tycho's observations; before him, all astronomers took the planetary orbits for excentric circles. The manner in which he proceeded was as follows.

Let S (*Plate XIX. Astronomy, fig. 3.*) be the sun, M Mars, D, E, two places of the earth when Mars is in the same point M of its orbit. When the earth was at D, he observed the difference between the longitudes of the sun and Mars, or the angle M D S; in like manner, he observed the angle M E S. Now the places D, E, of the earth in its orbit being known, the distances D S, E S, and the angle D S E, will be known; hence, in the triangle D S E, we know D S, S E, and the angle D S E, to find D E, and the angles S D E, S E D; hence we know the angles M D E, M E D, and D E, to find M D; and lastly, in the triangle M D S, we know M D, D S, and the angle M D S, to find M S, the distance of Mars from the sun. He also found the angle M S D, the difference of the heliocentric longitudes of Mars and the earth. By this method, Kepler, from observations made on Mars when in aphelion and perihelion (for he had determined the position of the line of the apides, by a method independent of the form of the orbit), determined the former distance from the sun to be 166780, and the latter 138500, the mean distance of the earth from the sun being 100000; hence, the mean distance of Mars was 152640, and the eccentricity of its orbit 14140. He then determined, in like manner, three other distances, and found them to be 147750, 163100, 166255. He next calculated the same three distances, upon supposition that the orbit was a circle, and found them to be 148539, 163883, 166605; the errors therefore of the circular hypothesis were 789, 783, 350. But he had too good an opinion of Tycho's observations, (upon which he founded all these calculations,) to suppose that these differences might arise from their inaccuracy; and as the distance between the aphelion and perihelion was too great, upon supposition that the orbit was a circle, he knew that the form of the orbit must be an oval: "Itaque planè hoc est: Orbita planetæ non est circulus, sed ingrediens ad latera utraque paulatim, iterumque ad circuli amplitudinem in perigæo exiens, cujusmodi figuram itineris ovalem appellitant," p. 213. And as, of all ovals, the ellipse appeared to be the most simple, he first supposed the orbit to be an ellipse, and placed the sun in one of the foci; and upon calculating the above observed distances, he found they agreed together. He did the same for other points of the orbit, and found that they all agreed: and thus he pronounced the orbit of Mars to be an ellipse, having the sun in one of its foci. Having determined this for the orbit of Mars, he conjectured the same to be true for all the other planets, and upon trial he found it to be so. Hence, he concluded, "that the six primary planets revolve about the sun in ellipses, having the sun in one of the foci."

The relative mean distances of the planets from the sun are as follow: Mercury, 38710; Venus, 72333; Earth, 100000; Mars, 152369; Jupiter, 520279; Saturn, 954072; Georgian, 1918352.

Having thus discovered the relative mean distances of the planets from the sun, and knowing their periodic times, he next endeavoured to find if there was any relation between them, having had a strong passion for finding analogies in nature. On March 8, 1618, he began to compare the powers of these quantities, and at that time he took the squares of the periodic times, and compared them with the cubes of the mean distances, but, from some error in the calculation, they did not agree. But on May 15, having made the last calculations

## PLANET.

calculations again, he discovered his error, and found an exact agreement between them. Thus he discovered that famous law, "That the squares of the periodic times of all the planets are as the cubes of their mean distances from the sun." Sir I. Newton afterwards proved that this is a necessary consequence of the motion of a body in an ellipse, revolving about the focus. Prin. Phil. lib. i. sec. 2. pr. 15.

Kepler also discovered, from observation, that the velocities of the planets, when in their apses, are inversely as their distances from the sun; whence it followed, that they describe in these points equal areas about the sun in equal times. And although he could not prove, from observation, that the same was true in every point of the orbit, yet he had no doubt but that it was so. He therefore applied this principle to find the equation of the orbit, and finding that his calculations agreed with observations, he concluded that it was true in general, "That the planets describe about the sun equal areas in equal times." This discovery was, perhaps, the foundation of the "Principia," as it might probably suggest to sir I. Newton the idea, that the proposition was true in general, which he afterwards proved it to be. These important discoveries are the foundation of all astronomy. Vince's Elem. of Astronomy.

The planes of the planetary orbits do all intersect in the sun; and the line in which the plane of each orbit cuts that of the earth, is called the *line of the nodes*; and the two points in which the orbits themselves touch that plane, the *nodes*. For the longitude of the nodes of the planets, see *NODE*.

The motion of the nodes is found by comparing their places at two different times; whence that of Mercury in 100 years is found to be  $1^{\circ} 12' 10''$ ; that of Venus,  $0^{\circ} 51' 40''$ ; that of Mars,  $0^{\circ} 46' 40''$ ; that of Jupiter,  $0^{\circ} 59' 30''$ ; that of Saturn,  $0^{\circ} 55' 30''$ . This motion is in respect to the equinox. The Georgian planet has not been discovered long enough to admit of determining the motion of its nodes by observation. M. de la Grange has found the annual motion to be  $12''.5$  by theory; but if we take the density of Venus according to M. de la Lande, it will be  $20'' 40'''$ , which he uses in his table.

The distance between the centre of the sun and the centre of each object, is called the *eccentricity of the planet*. For the eccentricities of the planets, see *EXCENTRICITY*.

The angle at which each plane cuts that of the ecliptic, is called the *inclination of the plane*.

The inclinations of the orbits of the planets are as follow: that of Mercury,  $7^{\circ} 0' 0''$ ; that of Venus,  $3^{\circ} 23' 35''$ ; that of Mars,  $1^{\circ} 51' 0''$ ; that of Jupiter,  $1^{\circ} 18' 56''$ ; that of Saturn,  $2^{\circ} 29' 50''$ ; and that of the Georgian,  $46' 20''$ . (See *NODE*.) For the elements of the orbits of Ceres, Pallas, Juno, and Vesta; see the preceding part of this article. See also *Planetary NUMBERS*.

**PLANETS, Motion of the.** That the planets do all revolve round the sun as their centre, and not round the earth, is evident from a thousand phenomena. 1. The orbit in which Venus, *c. gr.* moves, does certainly encompass the sun; and therefore, in describing that orbit, the planet must turn round the sun.

That her orbit includes the sun, appears hence, that she is sometimes above the sun, sometimes below it, sometimes beyond it, and sometimes on this side; all which are evident from the circumstances of her phases.

That she does not move round the earth, is no less apparent, from her being ever observed in the same quarter with the sun, never receding from him above  $48^{\circ}$ . She never, therefore, comes to be in opposition to the sun; no, not to be in a quartile aspect, or to have a quarter of the heavens between them; both which, like the earth, she

must frequently have, did she attend and move round the earth.

2. That Mercury revolves round the sun, appears in like manner from his phases, which resemble those of Venus and the moon; and from its neighbourhood to the sun, from whom Mercury never recedes so far as Venus does.

3. That the orbit of Mars includes the sun, is evident from that planet's being found both in conjunction and opposition with the sun; and in both cases shining with a full face. Indeed, from the same circumstances it appears, that the orbit of Mars encompasses the earth; but then it follows, likewise, from Mars's diameter appearing seven times as big when in opposition as when in conjunction, that he is seven times nearer the earth in the former than in the latter position. The earth, therefore, is far from being the centre of Mars's motion; but Mars is ever nearly at the same distance from the sun. Again, Mars viewed from the earth moves very irregularly; is sometimes seen to proceed slower, sometimes faster; sometimes he stands still, and sometimes he goes backward, (the reason of which see under the article *OPTICAL Inequality*); but viewed from the sun, he will ever appear to move with the same constant uniform tenor; whence it is evident he respects the sun, not the earth, as the centre of his motion.

4. The same appearances whence Mars is shewn to revolve round the sun as a centre, are likewise observed in Jupiter and Saturn; whence the same conclusion may be made of them.

Lastly, that the earth revolves round the sun, as a centre, is evident from her place, which we have observed to be between the orbits of Mars and Venus; and from the phenomena of the superior planets viewed from it. If the earth stood still, we should never see those planets either stationary or retrograde; the earth therefore moves, but it is still found between the orbits of Mars and Venus, which encompass the sun; therefore the earth also encompasses the sun.

To this astronomical demonstration may be added a physical demonstration of the earth's motion from sir Isaac Newton. It appears from abundant observation, that either the earth turns round the sun, or the sun round the earth, so as to describe equal areas in equal times; but he demonstrates, that bodies revolving about one another according to such law, do of necessity gravitate towards each other. Whence, if the sun gravitate to the earth, action and re-action being still equal, the earth will likewise gravitate towards the sun. But he proves, farther, that two bodies gravitating towards each other, without directly approaching one another in right lines, must both of them turn round the common centre of gravity of both. The sun and earth, therefore, do both revolve round one common centre; but the earth being but a point in comparison with the sun, the common centre of gravity of the two will be within the sun's body, and not far from its centre. The earth, therefore, revolves round a point within the body of the sun, and therefore round the sun. See the arguments for the earth's motion under *EARTH*.

To account for the motion of the planets about the sun, there needs nothing but to suppose an uniform projectile motion, in straight lines, at first given them; and a power of attraction or gravitation, such as we observe in all the great bodies in our system. For a body A (*Plate XIX. Astronomy, fig. 4.*) proceeding uniformly along the line A B, will, by the intervention of the attracting body C, be every moment diverted out of its rectilinear, and bent into a curvilinear path, according to the laws of central forces.

If, then, the projectile motion be perpendicular to a line, C A, drawn from the attracting body C, and its velocity be so proportioned to the force of attraction of A, as that

the centripetal and centrifugal forces are equal, *i. e.* that the conatus to fall to the central body C, in a right line, A C ; and that to proceed in the direction of the tangent, A B, balance each other ; the body will revolve in a circular orbit, A, B, C, D, &c.

It is not improbable, that at the beginning this was the state of things ; and that the velocities impressed on the several planets were so combined with their respective masses and distances from the sun at which they were to roll, as that their momenta should counterbalance the sun's attractive force, and be precisely counterbalanced thereby ; whence the primitive orbits must have been perfect circles, from which they do not even now deviate very far. See EXCENTRICITY.

If the planet's projectile motion be not perfectly adjusted to the sun's attraction, the orbit described will be an ellipsis. If it be too swift, the orbit will be greater than a circle, and the nearer focus coincide with the central body ; if too slow, the orbit will be less than a circle, and the farther focus coincide with the central body.

Indeed the form of the planetary orbits does not only depend on the adjustment of the first projectile velocity with the sun's attraction, but also on the direction in which that motion was originally impressed. If that direction were according to the tangent A B, as above supposed, and the central forces exactly balanced, the orbit would be circular ; but if that direction were oblique, in any manner, whether ascending to, or descending from the sun, the orbit of the planet, notwithstanding any adjustment of its velocity to the attraction, would be an ellipsis.

The motions of the planets in their elliptic orbits are not equable, because the sun is not in their centre, but in their focus. Hence they move, sometimes faster, and sometimes slower, as they are nearer or farther from the sun ; but yet these irregularities are all certain, and follow according to an immutable law.

Thus, suppose the ellipsis B E P, &c. (Plate XIX. *Astronomy*, fig. 5.) the orbit of a planet, and the focus S, the sun's place ; A P, the axis of the ellipsis, is called the *line of the apsides* ; the point A, the *higher apsis* or *aphelion* ; P, the *lower apsis* or *perihelion* ; S C, the eccentricity ; and E S, the mean distance of the planet from the sun.

Now the motion of the planet in its perihelion is swiftest, and in its aphelion, slowest ; at E the motion as well as the distance is mean, *i. e.* it is such as would describe the whole orbit in the same time it is really described in.

The law by which the motion is regulated in every point of the orbit, is, that a line, or radius, drawn from the centre of the sun to the centre of the planet, and thus carried along with an angular motion, does always describe an elliptic area proportional to the time. Suppose, *e. gr.* the planet in A, and thence, in a certain time, to proceed to B ; the space or area the radius S A describes, is the triangle A S B : when at length the planet arrives at P, if from the centre of the sun S there be drawn S D, in such manner, as that the elliptic area P S D is equal to that of A S B ; the planet will here move through the arc P D, in the same time in which it moved through the arc A B ; which arcs are unequal, and nearly in a reciprocal proportion to their distance from the sun. For from the equalities of the areas it follows, that the arc P D must exceed A B as much as S A exceeds S P.

This law was first demonstrated by Kepler, from observation ; and is since accounted for by sir I. Newton from physical principles ; and to which all astronomers now subscribe, as of all others that which best solves the planetary phenomena. See CENTRIPETAL Force and GRAVITATION.

From the equal description of areas about the sun in equal times, it appears that the planets move with unequal angular velocities about the sun. Let A P Q (Plate XIX. *Astronomy*, fig. 6.) be an ellipse described about the sun S in the focus, the indefinitely small area, P S p, described in a given time, will be constant ; draw P r perpendicular to S p ; and as the area S P p is constant for the same time, P r varies

as  $\frac{1}{S p}$  ; but the angle p S P varies as  $\frac{P r}{S p}$ , and, therefore, it varies as  $\frac{1}{S p^2}$  ; that is, in the same orbit the angular

velocity of a planet varies inversely as the square of its distance from the sun. For different planets, the areas described in the same time are not equal, and therefore P r varies as  $\frac{\text{area } S P p}{S p}$ , consequently, the angle p S P varies as

$\frac{\text{area } S P p}{S p^2}$  ; that is, the angular velocities of different planets are as the areas described in the same time directly, and the squares of their distances from the sun inversely. Hence we obtain a solution of the problem, usually called " Kepler's problem," in the manner stated under the article ANOMALY. For the method of finding the equation of the centre, see EQUATION ; and for the eccentricity, see EXCENTRICITY.

*Computation of a Planet's Motion and Place.*—As to the periods and velocities of the planets, or the time in which they perform their courses, they are found to have a wonderful harmony with their distances from the sun, and with one another. The nearer each planet is to the sun, the quicker still is its motion, and its period the shorter. The great law they here all immutably observe is, that the squares of their periodical times are as the cubes of their distances from the centres of their orbits.

The knowledge of this law we also owe to the sagacity of Kepler, who found it to obtain in all the primary planets ; as astronomers have since found it also to do in the secondary ones.

Kepler deduced this law merely from observation, and comparison of the several distances of the planets with their periods : the glory of investigating it from physical principles is due to sir Isaac Newton, who has demonstrated, that, in the present state of things, such a law was inevitable.

A planet's motion, or distance from its apogee, is called the *mean anomaly* of the planet ; and is measured by the arc or area it describes in the time. When the planet arrives at the middle of its orbit, or the point G, the distance or time is called the *true anomaly*. (See ANOMALY.) When the planet's motion is reckoned from the first point of Aries, it is called its *motion in longitude* ; which is either mean, *viz.* such as the planet would have, were it to move uniformly in a circle ; or true, which is that with which the planet actually describes its orbit, and measured by the arc of the elliptic it describes.

Hence may the planet's place in its orbit for any given time after it has left the aphelion be found. For suppose the area of the ellipsis so divided by the line S G, that the whole elliptic area may have the same proportion to the area A S G as the whole periodical time in which the planet describes its orbit has to the time given : in this case G will be the planet's place in its orbit.

The mean motions of the planets might be easily determined from their conjunctions and oppositions, if we knew

the places of the aphelia, and the eccentricities of their orbits; for then we might find the equation of the orbit, and reduce the true to the mean place; and the mean places being determined at two points of time, give the mean motion corresponding to the interval between the times. But the place of the aphelion is best found from the mean motion. To determine, therefore, the mean motion, independently of the place of the aphelion, we must seek for such oppositions or conjunctions as fall very nearly in the same point of the heavens; for then the planet being very nearly in the same point of its orbit, the equation will be very nearly the same at each observation; and therefore the comparison between the true places will be nearly a comparison of their mean places. If the equation should differ much in the two observations, it must be considered. By comparing the modern observations, we shall be able to obtain nearly the time of a revolution; and then, by comparing the modern with the ancient observations, the mean motion may be very accurately determined; for any error, by dividing it amongst a great number of revolutions, will become very small in respect to one revolution. Professor Vince has illustrated this method by an example in the planet Saturn, taken from M. Cassini. (*Elem. d'Astron.* p. 362.) and accompanied with the proper explanations. (See his *Elem. of Astron.*) The mean annual motion of this planet is there deduced to be  $12^{\circ} 13' 35'' 14''$ , and the mean daily motion to be  $2' 0'' 35'''$ . Dr. Halley makes the annual motion to be  $12^{\circ} 13' 21''$ . M. de Place makes it  $12^{\circ} 13' 36''.8$ . As the revolution thus determined is that in respect to the longitude of the planet, it must be a tropical revolution. Hence, to get the sidereal revolution, we must say,  $2' 0'' 35''' : 24' 42'' 20'''$  (the precession in the time of a tropical revolution) :: 1 day :  $12^d 7^h 1' 57''$ , which added to  $29^y 162^d 4^h 27'$ , gives  $29^y 174^d 11^h 28' 57''$ , the length of a sidereal year of Saturn. By this method we may find the periodic times of all the superior planets. The periodic times of the inferior are found from their conjunctions.

The periodic times of the primary planets, copied by professor Vince in his "Elements," p. 113, from La Lande, are as follow: Mercury,  $87^d 23^h 15' 43''.6$ ; Venus,  $224^d 16^h 49' 10''.6$ ; Mars,  $1^y 321^d 23^h 30' 35''.6$ ; Jupiter,  $11^y 315^d 14^h 27' 10''.8$ ; Saturn,  $29^y 174^d 1^h 51' 11''.2$ ; the Georgian,  $83^y 150^d 18^h$ . The latter is unquestionably erroneous, though copied by many writers, without sufficient attention, from La Lande; as we have shewn in our article *Planetary NUMBERS*. It should have been  $84^y 28^d 16^h 55'$ . From the tropical period assigned in the article just cited, we deduce the sidereal period, thus: As  $365^d.242 : 50.3$  (precess.) ::  $30589.352$  (trop. per.) :  $4212''.5$  the precession in Georgian's whole tropical period: then  $4212''.5$  whole precess.

$42''.4$  daily motion =  $99^d 8^h 28'$  to be added to the tropical period for the sidereal: consequently

$$30589^d 8^h 27' \text{ tropical period} \\ + \quad \quad \quad 99 \quad 8 \quad 28 \text{ arising from precession}$$

$30688 \quad 16 \quad 55 =$  the sidereal period: and

$$\frac{30688.705}{365} = 84^y 28^d 14^h 55', \text{ the period in years of} \\ 365 \text{ days, hours and minutes.}$$

N. B. The daily motion of the Georgian in the ecliptic is above taken from La Lande's tables at  $42''.4$ ; but more exactly it is  $42''.367$ , &c.

For the irregularities in the motions of the primary and secondary planets by their mutual attractions, see *ECLIPIC*,

*GRAVITATION, MOON, NUTATION, PRECESSION of the Equinoxes, Solar SYSTEM, TIDES, &c.*

*PLANETS, the Phenomena of the inferior*, are their conjunctions, elongations, stations, retrogradations, phases, and eclipses. See *CONJUNCTION, ELONGATION, STATION, RETROGRADATION, &c.*

*PLANETS, Phenomena of the superior*, are the same with those of the inferior; with an additional one, *viz.* opposition.

*PLANET, the particular phenomena, circumstances, &c. of each*, see under the name of the respective planet, &c. *JUPITER, MARS, &c.*

*PLANETS, Configuration of the.* See *CONFIGURATION.*

*PLANETS, Theories of the.* See *THEORY.*

*PLANETARIUM*, a machine for representing the motions of the primary planets by wheelwork. This machine differs from an *orrery* in this respect, that it does not profess to exhibit any of the diurnal rotations, but confines its operations to the production of the annual motions alone. These motions may be either *mean* or *equated*; the latter of which were first exhibited, agreeably to the Copernican system, by Huygens's automaton, in 1682; and the former by Roemer's planetarium, soon after. It is not, however, our intention to describe, under the present article, any of the planetary machines which may at the present day be considered as obsolete; but to reserve for our subsequent article an historical account thereof, agreeably to the order of time; and to confine ourselves here to a description of those planetaria of our own time, which either have been adopted, or, from their superior powers, appear to us to merit our public notice, as models for future imitation; to some of which we have already referred from our article *ORRERY*.

*Common Planetarium.*—It will be seen in our subsequent historical account of *PLANETARY Machines*, that the common planetarium, that presents itself to the eye, as we pass the windows of the mathematical instrument-makers, borrows the numbers of its planetary calculations chiefly from Huygens, and its construction from the planetarium of Roemer, with little or no deviation, except what arises from superior workmanship; and, in some instances, from the addition of the planet Georgian. The common planetarium has its wheelwork represented by *fig. 1.* of *Plate X.* of *Planetary Machines*, the effects produced by which may be thus briefly described; *viz.* *abcd* is a brass frame, similar to the frame of an ordinary clock, in which are contained twelve wheels and pinions, actuating one another respectively in such a way, as to produce the mean motions of the six primary planets, that have been long discovered, of which our earth is one. *AB* is a revolving arbor, pivotted into holes made in the upper and lower plates of the frame, and is made to revolve by means of an endless screw, acting with the lowest wheel of 83 teeth, which is made fast to it, as are also the five other wheels and pinions, with the numbers of teeth specified in the figure. *CD* is an upright stem of steel wire, screwed fast into the lower plate at *C*, and ascending through a large hole made in the upper plate, which it does not fill. The six wheels revolving round this stem have each a separate tube, to the inferior ends of which they are respectively attached; and the tubes are so contrived, that the exterior surface of the innermost forms a stem for the bore of the next largest, till all the six are fitted one within another round the stem of steel, which keeps them in a vertical position, while they revolve separately with different velocities. The arbor *AB*, which receives its motion from the handle, by the medium of the endless screw, is assumed as revolving in a year, which may be either civil, sidereal, or tropical; but whichever be the period assumed

# PLANETARIUM.

assumed, the pairs of wheels that act together respectively will be so many fractions of that period. Thus, the lowest wheel of 83 teeth, on the annual arbor, will drive its fel-

low 20, with its tube, round in  $\frac{20}{83}$  of a year; and the

little arm, that is fixed by friction on its superior end, will perform a revolution round the sun in the same time. In

like manner, the period of Venus will be performed in  $\frac{32}{52}$

			D.	H.	M.	S.
Mercury will revolve in	$\frac{20}{83}$	of 365.242, &c. or	88	0	14	24
Venus - - -	$\frac{32}{52}$	of ditto,	or	224	18	20 9
Earth - - -	$\frac{50}{50}$	of ditto,	or	365	5	48 48
Mars - - -	$\frac{75}{40}$	of ditto,	or	684	19	52 19
Jupiter - - -	$\frac{83}{7}$	of ditto,	or	4330	17	30 3
Saturn - - -	$\frac{147}{5}$	of ditto,	or	10738	2	54 43

If these periods be compared with the true periods given under *Planetary NUMBERS*, it will be seen that the mean motions produced by this simple mechanism are far from being accurate, and that the errors, by continual accumulation, will become sensible in a comparatively short space of time; but where general representation only is aimed at, and the respective *times* of the phenomena exhibited by the planetarium are disregarded, this is the cheapest and simplest construction of a planetary machine that has yet been devised; and where its imperfections can be dispensed with, its simplicity is no small recommendation. Still, however, the *true places* of the planets, depending on the *equations* as well as *mean motions* of these bodies, are not the places indicated by this planetarium, supposing its mean motions ever so accurate; nor are the motions of the five recently discovered planets attempted to be exhibited, which they might be by additional wheelwork, without altering the construction of the machine. For the use of those who are satisfied with the representation of mean motions only, we beg leave to suggest the numbers suitable for wheels, that will produce

the revolutions of these five diminutive bodies also. Let  $\frac{95}{26}$

be taken for Vesta,  $\frac{74}{17}$  for Juno, and  $\frac{72}{20}$  for both Ceres and

Pallas, with one tube only for these two pairs; and these wheels, acting in the same way that has been described, will give the mean revolutions with as much accuracy as the present state of our knowledge of the motions of these little bodies will allow. The planet Herschel would require

$\frac{335}{4}$  for its long period, which numbers are impracticable in a small machine; but for this planet a train might be substituted, such as will be described as forming a part of the following machine.

When a planetarium of this common construction is fitted up, its appendages are usually a lunarium and tellurium, separately adapted to the same stand; but in those, the annual and lunar trains are never free from considerable errors.

of the year; the earth in  $\frac{50}{50}$ , or one year; Mars in  $\frac{75}{40}$ ;

Jupiter in  $\frac{83}{7}$ ; and Saturn in  $\frac{147}{5}$ ; the driving wheels be-

ing the denominators of the fractions, and the driven ones the numerators, agreeably to our directions given under the article *Planetary NUMBERS*, for computing the value of wheelwork acting in this simple manner.

If we assume an exact solar year as the period of the first moving or driving wheels, then the fractions will produce the periods subjoined, *viz.*

*Planetarium constructed at the House of the Royal Institution.*—When the late Dr. Garnett resigned the lectureship of the Royal Institution, and took his astronomical and other apparatus with him into Great Marlborough-street, his successor, Dr. Thomas Young, was authorized by the managers of the institution to procure as good a planetarium for his lectures as he could get for about fifty pounds; this being considered as large a sum as the state of the finances would allow to be expended on one instrument, consistently with the other demands of the apparatus room. The doctor, in consequence of the permission thus given him, examined the shops of the different mathematical instrument-makers for a machine already made, which might be considered as adequate to the illustration of the solar system, in a large and magnificent lecture room. His inquiries, however, were unsuccessful; but having heard that astronomical mechanism was a subject which had occupied the attention of the Rev. W. Pearson, he introduced himself to that gentleman in the autumn of 1801, for the purpose of conferring with him on the subject. The result of this conference was, that, being a proprietor of the Royal Institution from its first establishment, and having consequently an interest in promoting its success, Mr. Pearson agreed to calculate, contrive, and draw a plan for a new instrument, which was accordingly done, and put into the hands of Kenneth McCulloch, an old but ingenious workman employed at that time in the workshops of the institution.

The materials being prepared, the machine was begun in the summer of 1802, and finished in that of 1803, after having been used, in an unfinished state, in the spring course of lectures of the latter year. The arrangement and dimensions of the various parts of the machine are as follow, *viz.* In *fig. 2*, A B C D represent a strong frame of mahogany, well seasoned, and firmly put together, 5 feet 2 inches high, and 2½ feet across; the two upright pieces of which are each in substance 4 inches by 1½, and braced, as seen in the figure; and the cross foot-pieces are each 32 inches long, for the sake of steadiness. Above the cross bar, A B, is another bar E F, 6 inches from the former, which turns upon very strong metallic pivots of five-eighths of an inch

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diameter, upon brads bearing-pieces, at E and F, which are divided across the centres of their holes, and allow the bar to be taken off and put on at pleasure, by means of a joint, that permits the upper part of each bearing-piece to be turned back. To the shoulders of the pivots are attached the semicircular brads plates, G, G, one-fourth of an inch thick, in which holes are drilled in the horizontal and perpendicular lines, and also at  $45^\circ$ , and at other intermediate angles; into some of which holes two steel bolts, H, H, placed on the bar A B, are inserted, to sustain the mechanism, placed on the moveable bar E F, in any given position. This method of mounting the superstructure gives a degree of steadiness, which could not be obtained from a central joint, and is equally capable of different degrees of elevation. It was found necessary, however, to have a contrivance for either discharging or locking both the bolts at the same time; which contrivance was the invention of K. McCulloch, and answers its purpose completely. The mechanism is simply this: a thick circular plate of brads has an arbor rivetted into it, which passes down through the centre of the fixed bar A B, and has a thumb-piece, I, inserted below, and close to the bar, on a square filed upon its lower extremity, and pinned fast. The circular plate lies with its plane flat upon the bar, with the upper end of the arbor projecting a little; then a diametrical line being drawn across the plate, and divided into two equal parts, a semicircle is drawn from each of the two points, which lie equidistant at opposite sides of the centre, with such a radius, that the diameter of each may be equal to the portion of the bolt which requires to be drawn out. One of the small semicircles is drawn entirely upon one semicircle of the plate, and the other upon the other; after which the two designated small semicircles are perforated in various places, nearly in the shape of an S, and the intermediate solid parts filed away, and rendered perfectly smooth with a burnisher. Each bolt is bent in the form of a half-crank, the remote ends of which are cylindrical, and pass through two cocks fixed on the bar A B; whilst the interior ends are flat, and move each in a dove-tailed groove, made in the wood of the bar under the metallic plate. A steel pin, fixed into each sliding brads bar of the crank-piece, exactly fits, and passes through each semicircular perforation of the circular plate, and completes the contrivance. The manner of applying this mechanism to its purpose is this: as the thumb-piece below the bar, A B, is fast to the arbor of the circular plate above the bar, turning it half round carries the plate along with it half a turn; in consequence of which, the metallic pins, rivetted into the sliding bars of the cranked bolts, are made to approach to, or recede from, the centre of the metallic plate, by reason of their connection with the small semicircular perforations, accordingly as the thumb-piece is turned one way or the other half round; and thus both the bolts are pushed in or out at pleasure by the mere turning of the thumb-piece, and will be kept fast to their places in any situation without an additional security.

Having described the stand of this planetarium, and pointed out the application of its different parts to constitute a whole, we come next to particularize the mechanism which the superstructure is composed of, and to shew the mutual relations of the various portions to each other, in regular succession. The wheelwork, which constitute the ratios of the velocities of the different bodies, claim our first notice.

L M N O, in *fig. 3*, is a frame of strong brads, kept together by four brads pillars, fastened at both ends by thick screws, so that either the upper or the lower plate will take off separately. The length of each plate is  $11\frac{1}{4}$  inches, and the breadth 7; and the height of the pillars between the

plates  $2\frac{1}{2}$ . This frame contains the trains of wheelwork, which produce the respective revolutions of all the primary planets that had been discovered at the time of its invention, including Ceres and Pallas. To shorten the description, we will postpone the dimensions of the wheels, and insert them in a table, where the reader may refer to them after.

At R is an arbor projecting downwards, pivotted into the upper and lower plates of the frame, and revolving, by the application of any power, in the assumed period of an exact solar year. Q Q is an arbor screwed fast to the lower plate, and, instead of revolving itself, suffers all the wheels which are borne by it to revolve loosely round it. P P is another arbor of the same kind, but longer, and extending 5 inches upwards above the frame, to support the sun and his mechanism. To give the reader a competent idea of the operation and order of the different trains, we will first lay before him the following Table, and then explain it, as it has a reference to the drawing where the same numbers occur.

Order of the Trains.

	Revolving Arbor R.	Fixed Arbor Q Q.	Tubes over P P.
Mercury -	90	22 } 68 }	67
Venus -	113	32 } 29 }	63
Earth -	60	60 } 60 }	60
Mars -	53	56 } 50 }	89
Ceres } Pallas }	-	21 } 121 } 60 }	48
Jupiter -	22	111 } 40 }	94
Saturn -	7	124 } 59 }	98
Georgian, or } Herschel }	7	105 } 12 }	67

1st. The wheel of 90 is placed first, or lowest, fast to the revolving arbor R, and drives the wheel of 22 round the fixed arbor Q Q; and along with it the contrate wheel of 68, which is attached to it, and which drives the contrate or last wheel of the train 67, fixed on the longest and innermost tube, to the top of which is fixed the radius vector of Mercury. The communication is made from 68 to 67 by the medium of two similar pinions.

2dly. The wheel of 113 is fixed next over the 90, on the arbor R, and drives its fellow 32 round arbor Q Q, together with 29, to which it is fastened; the latter of which impels the second tubed wheel of 63 round in the tropical period of Venus.

3dly. Four wheels of each 60 teeth are employed in a similar manner, to produce the earth's revolution in an exact solar year; and the last of the four is fastened to the third revolving tube, to carry the annual bar, or radius vector of the earth.

4thly. A

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4thly. A wheel of 53 succeeds on the arbor R, to drive round Q Q the wheel of 56, to which is fastened the wheel 50, to actuate the fourth tubed wheel of 89 in the tropical period of Mars.

5thly. A small wheel of 21 is next mounted on the arbor R, to drive 121 round Q Q, and with it 60 as a fellow for 48, to which is attached the fifth revolving tube, which carries both Ceres and Pallas round in the same period; the difference of their respective velocities being not yet sufficiently ascertained to require a difference in the wheelwork.

6thly. The small wheel 22 comes next on the arbor R, and drives 111 round Q, and also with it 40, as a fellow for the sixth tubed wheel of 94, with which is connected the radius vector of Jupiter.

7thly. The long pinion of 7, which is cut in the solid part of the arbor, is common to both Saturn and Georgian, and drives the wheel 124 round the fixed arbor Q Q, and with it 59, as a fellow, to impel the seventh tubed wheel of 98 in Saturn's period.

Lastly: The said pinion of 7 also drives, by its upper end, the wheel 105, and along with it the perforated pinion 12, which makes the wheel 67 together with the eighth tube revolve, and conduct on its upper end the radius vector of Herschel.

This is the *order* in which the wheels stand when they act; and their number might have been diminished one half, if accuracy in the calculations had not been considered as a primary object. But to obtain a great degree of accuracy,

the numbers that constitute the ratios of a year necessarily run high, and render it unavoidably requisite to break the high simple fractions into compound ones of fewer figures, but of the same value; or, which is the same thing, it became expedient to substitute, in the most convenient manner, a train of wheels for each planet, instead of a simple pair, where great accuracy must have been out of the question. By this adoption, it will be seen in the subjoined table of the powers of the wheelwork, that a greater degree of accuracy is attained than had perhaps ever been before accomplished; and that not merely in one, but in all the revolutions of the different primary planets.

But before we give the tables of dimensions and powers of the wheelwork, it will be proper to observe that *fig. 4*, which is an end-view of the frame, represents three brass bridges, with tubes fastened to them, to be interposed between the revolving tubes, in order to bear the weight of the machinery, and to take off the friction, which would otherwise have been too considerable to be dispensed with. The first bridge, 1,1, spans over the tubed wheel of Mercury, and has its tube next in length to that of Venus, that a motion may be derived therefrom to the sun's axis. This bridge is screwed to the upper side of the lower plate of the frame. The second bridge, 2,2, with its tube, is placed over the tubed wheel of the earth, and is fastened by screws upon the lower plate, like the first bridge; and the third bridge, with its tube, lies between the tubed wheel of Saturn and that of Jupiter, and is supported by the upper plate of the frame, and is therefore inverted.

Powers of the Wheelwork.

Planets.	Fractions of a Year, or Trains from 365.24222 Days.	Periods of the Wheelwork.	Periods by La'ande's Tables.
Mercury - -	$\frac{22}{90} \times \frac{67}{68}$	D. H. M. S. 87 23 14 35.796	D. H. M. S. 87 23 14 35.2
Venus - -	$\frac{32}{113} \times \frac{63}{29}$	224 16 42 1	224 16 41 30
Earth - -	$\frac{60}{60} \times \frac{60}{60}$	365 5 48 48	365 5 48 48
Mars - -	$\frac{56}{53} \times \frac{89}{50}$	686 22 20 41.19	686 22 18 37
Ceres and Pallas -	$\frac{121}{21} \times \frac{48}{60}$	1683 14 14 26.592	
Jupiter - -	$\frac{111}{22} \times \frac{94}{40}$	4330 14 39 5	4330 14 40 30
Saturn - -	$\frac{124}{7} \times \frac{98}{59}$	10746 18 54 20	10746 19 20 0
Georgian or Herschel	$\frac{105}{7} \times \frac{67}{12}$	30589 0 52 0	30589 8 27 0
Sun - -	$\frac{19}{137} \times \frac{25}{62}$ of Mercury's Rev.	25 10 0 0.223	25 10 0 0

But

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But notwithstanding the mean motions of all the planets are represented by this wheelwork with extreme accuracy, yet, if they were all *equable*, the true apparent places of the planets would not be accurately exhibited, except at the aphelion and perihelion points of their orbits, where the aggregate of all the increments and decrements of motion balance one another, *i. e.* where there is no equation of the centre, or prosthaphæresis; for all the planets, that have any considerable excentricity in their orbits, continue many days longer in one half of their orbit than in the other: for instance, Mercury, as we have said in another place, continues about  $55\frac{1}{2}$  days in one half of its orbit, and only  $32\frac{1}{2}$  in the other; and even in the earth's motion, the difference amounts to 7.8 days, where the excentricity of the orbit is very small. Hence arises the necessity of some mechanical means for accelerating and retarding, alternately, the various motions of the different heavenly bodies in the respective parts of their orbits, that the heliocentric places may accord, from day to day, with the places calculated in the Nautical Almanac, and in White's Ephemeris; and also that the days of opposition and conjunction, the times of the stations, and the respective durations of the apparent direct and retrograde motions, may be all accurately indicated; none of which, a machine representing only mean motions can have any pretensions to effect, however accurately its wheelwork may be calculated. Likewise, to make the geocentric appearances what they are in the sky as seen from the earth, and what they are calculated to be in the Nautical Almanac, and in White's Ephemeris, the *variable distances* must be also represented, otherwise the greatest elongations of Mercury, and the annual parallaxes of the superior planets, would always remain the same, as though their orbits were in concentric circles round the sun.

To effect the two requisites of varying velocities and of varying distances, the two following contrivances are adopted, which, without adding much to the complexity of the mechanism, completely produce both the desired effects, and consequently all the phenomena dependent upon them: first, the tubed wheels of those planets, which have considerable excentricity, and consequent variation of motion, have their teeth cut in so peculiar a manner, that the size of them varies gradually throughout the whole of each semicircle, so as to throw just so many teeth more into one half of the wheel than into the other, as are proper for producing *one half* of the grand equation of each planet; and, secondly, a small arm suspended at the extremity of each radius vector, and revolving with the planet in a retrograde direction, by means of an appended weight, shews both the *variation of distance*, and also the *other half* of the grand equation. The weight, too, is adjustable, so as to make the aphelion and perihelion points fall in their proper places in the ecliptic; and what is a wonderfully lucky coincidence of circumstances, the same mechanism, that answers these purposes, preserves, moreover, the parallelism of the axis of every planet, as well as of the ring of Saturn. The proportion between the radius vector and short arm of each planet is as the radius of the planet's orbit to its excentricity; the radius *plus* the excentricity being equal to the aphelion distance, and the radius *minus* the excentricity being equal to the perihelion distance. See *EQUATION Mechanism*.

It would exceed the limits of this description, were we to introduce here the proper directions for cutting the tubed wheels in the requisite manner. Suffice it, therefore, to say, that the inventor lent to the institution a cutting engine of his own, on the plate of which he had previously divided all the required circles in such a way, as would necessarily divide and cut the wheels in a proper manner by its ordinary operation, without any extra skill in the workman. The danger of

inaccuracy, in the execution of this otherwise extraordinary process, was thereby obviated; and he had the satisfaction of seeing a practical difficulty vanish, which might have proved insuperable to the mere theorist. Care, however, was previously taken to ascertain that the largest and smallest tooth of every wheel were capable of being acted upon by the mean-sized teeth of the driving wheel, with which each tubed wheel had to co-operate; but it was found that the disparity between the largest and smallest teeth of Mercury's tubed wheel was too considerable to admit of the same method of cutting the teeth, that would apply to the rest: hence, had no other practicable method of effecting half the equation of this planet presented itself, the motion could not have been made perfect enough for the requisite purpose; but fortunately a second method occurred of producing the required degree of acceleration and retardation, and that without any inequality at all in the teeth, which was that of placing the tube as much out of the centre of the wheel as is equal to the excentricity of the orbit, the radius of the wheel being taken as its radius. The wheel consequently was made a contrate one, and takes its motion from its fellow, by the interposition of two pinions placed at opposite ends of an horizontal arbor; which arbor is sustained by the lower plate of the frame, and pivoted into a cock at each end. The pinion which drives the excentric contrate wheel was, therefore, required to be longer than double the excentricity of the wheel, that it might not escape its teeth: likewise the spaces of the wheel were required to be filed with an equalling file, held in a direction pointing not to its centre, but to the excentric point in which the tube is fixed, in order that, during its action, the friction might be as little as possible.

This method of producing unequal motion, we have before said, was first applied by Huygens in his automaton planetarium; but we have shewn (under *EQUATION Mechanism*) that he mistook the effect, by supposing that the *whole* equation would be thus produced, whereas, in fact, only *one-half* of it is effected, which is what the inventor's purpose requires.

As the exact periods and other data of the orbits of the two newly-discovered planets, Ceres and Pallas, were not ascertained with sufficient accuracy, their tubed wheel was cut, *pro tempore*, into equal teeth, as was also that of Venus, by reason of her excentricity being too inconsiderable to require notice; but the other planets have the teeth of their tubed wheels so distributed in the two semicircles, which are bisected by the line of the apides, that one semicircle of each contains more teeth than the other, in the proportion expressed in the annexed table.

TABLE of the Teeth contained in the respective Aphelion and Perihelion Semicircles.

	Aphelion Semicircle.	Perihelion Semicircle.	Wheels.
Mercury -	Teeth. 37.9	Teeth. 29.1	67
Earth - -	30.3	29.7	60
Mars - - -	47.2	41.8	89
Jupiter - -	48.4	45.6	94
Saturn - - -	50.75	47.25	98
Georgian, or } Herchel }	34.6	32.4	67

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The above table will assist the workman in estimating the perfection of the cutting by an engine with appropriate unequal divisions; for when a diametrical line is drawn from the aphelion to the perihelion points marked on each wheel, each of those semicircles will contain the same number of teeth, notwithstanding another line bisecting this at right angles will contain those proportions which are expressed in the table; an examination of this kind will be a check upon the workmanship.

The tubes move round one another without the least shake, and extend above the frame unequally, the innermost, or longest, being  $6\frac{1}{2}$  inches long, and  $\frac{1}{10}$  bore, and the outermost, or shortest,  $\frac{3}{4}$ ths of an inch long, and  $\frac{1}{4}$  bore; they go within one another, as in the common planetarium, in order that all the radii vectores may be borne by the upper ends of their respective tubes.

Fig. 5. exhibits to view the under face of the lower plate of the frame, in which the same letters denote the same parts as in fig. 3.

This lower plate of the frame, that contains the wheel-work, is bedded into and screwed fast to the upper surface of the moveable cross-bar of mahogany E F, so that the tubes may be exactly over the middle of it; and the upper plate of the said frame is bedded into, and made fast to a circular mahogany board of forty-six inches diameter, to which it is attached by several strong brass bars, which are screwed both to the brass frame and to tapped brass nuts let into the circular board below: the tubes project through a central hole, made in the large circular board, just large enough to admit them to pass through it: the frame and circular board, therefore, may be put into either a horizontal or perpendicular direction, or into any intermediate elevation, in any of which positions it will be kept steady by the bolts H, H. The circular board is composed of many separate pieces of wood, fitted together in such shapes, and in so compact a manner, as to prevent its warping, in doing which, the contriver, M'Culloch, shewed great ingenuity: this circular board is painted blue on its upper surface, and has a large ecliptic mounted upon it by means of twelve perforated pillars of blackened wood, through which metallic rods pass and screw at both ends, above into fixed nuts under the ecliptic circle, and below into loose nuts under the circular board, so that the ecliptic may be mounted or dismounted at pleasure. This ecliptic circle, which is three feet and a half diameter within, and four feet and a half across the extremities, has the characteristic animals, or supposed animals, beautifully painted in oil colours on a black ground, and surrounds all the radii vectores, and therefore must be considered as the Earth's orbit projected into the heavens beyond the planetary system; it serves admirably to rectify the planets by, and also to ascertain all their heliocentric and geocentric places, at the same time that it adds greatly to the grandeur of the tout ensemble appearance of the machine, when in an erect position before an audience.

The radii vectores, short arms, weights, and the other visible parts of the mechanism, for the sake of effect, are also painted blue, except the ivory balls which represent the planets, the contrast between which and the blue ground behind, gives the semblance of real motion, without mechanical means, to an eye placed in front, at the remote part of the theatre.

A spectator viewing the planets obliquely, will moreover perceive them project beyond the ecliptic in one-half of their orbits, and retire within it in the other, which motion constitutes their variation of latitude, or deviation from the

plane of the ecliptic; another effect which is not usually shewn by a planetarium; and the quantity of latitude north or south of each planet is indicated by small fixed hands pointing to the respective small revolving plates borne by the projecting stems of the radii vectores; which plates are silvered, and properly divided and figured by an engraver. The planets Mercury, Ceres, Pallas, and Mars, having no secondaries, have their latitudes shewn by a bend on the exterior ends of the projecting stems of the radii vectores, round which bent parts the small arms revolve, so as to make their respective angles with the plane of the ecliptic. This method of shewing the latitude is very simple, but requires the small arms to be elongated beyond what they would have been, when moving in the plane of the ecliptic, in the same proportion that the hypotenuse of a right-angled triangle is to its base, the included angle being subtended by such a perpendicular line as will be a sine to the requisite degrees of heliocentric latitude, at the distance from the sun of the radius vector of each planet.

The stems on which the arms and weights revolve screw into nuts under the ends of the radii vectores, by means of which the inclination of the bent ends may be set to any particular situation, so as to make the nodes fall in their due places with respect to the ecliptic; and by being thus adjustable, the stems may be easily rectified for the motion of the nodes at the end of every century, or longer period of time. The idea of bending the ends of the stems was suggested by Dr. T. Young, and affords a simple method of effecting the latitude of all the planets in question, except that of Pallas, the latitude of which is too great to be altogether represented by such a limited arm as the other parts of the mechanism will allow: the planet Venus having considerable latitude, and very little eccentricity, required a different contrivance, as did also those planets which have secondaries; otherwise the planes of the orbits of the secondaries would have been turned into various angles, as they regard the ecliptic, in different situations of the radii vectores. The application of an inclined circular plate promised best to produce the desired effect of raising and depressing Venus, and the system of Jupiter, Saturn, and Georgian or Herschel, and were therefore adopted. The action of the inclined plate on the stem of the planet, is caused by a notch on the stem resting against the edge of the fixed plate, while the small arm, revolving round the said plate, carries the stem round it; by which means the planet carried by the stem projects and recedes alternately, as much as one edge of the circular plate is more prominent than the other. This effect is not easily comprehended from a simple verbal description, but is readily perceived in the machine.

With respect to the distances of the planets from the sun, it was impossible to observe the exact proportions without making the sun's ball very minute, and Mercury close to it, or else Georgian at an immense distance from the sun; in which case the machine must have been a horizontal one, and the ecliptic circle in another situation. It was, therefore, determined, that though the *exact proportions* of distance could not be preserved, yet the lengths of the radii vectores should be in due proportion, as far as to Mars inclusively, upon a scale that made the Earth five inches from the sun, and that the longer radii vectores should be an exact fractional part of their due lengths, rather than have no proportion at all, as is the case in the common planetaria.

These lengths of the radii vectores, and the corresponding lengths of the short revolving arms which represent the respective eccentricities proportional to the lengths of the radii vectores, are expressed in the annexed table.

TABLE

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TABLE of Distances and Excentricities of the Planets in the Planetarium.

Planets.	Mean Distance from Sun in Inches.	Ratio to the Earth.	Short Arms.
Mercury -	1.94	1 : 1	0.38
Venus - -	3.61	1 : 1	0.025
Earth - -	5.0	1 : 1	0.08
Mars - -	7.61	1 : 1	0.69
Ceres - -	10.35	3 : 4	0.87
Pallas - -	10.35	3 : 4	2.59
Jupiter - -	13.0	1 : 2	0.62
Saturn - -	15.9	1 : 3	0.88
Georgian or Herschel }	19.19	1 : 5	0.91

The radii vectores have each a counterpoise, and are fastened to the ends of their tubes by a clamping-piece of brass attached to each of them by pins, and made so as to be tightened by a screw, which draws the ends near together.

The inclination of the orbits are proportioned thus: *viz.*

The inclination of	{	Mercury	=	7°	0'	0"	at	1.94	} distance is subtended by	{	0.237
		Venus	=	3	23	35	at	3.61			0.213
		Mars	=	1	51	0	at	7.61			0.247
		Ceres	=	10	37	56	at	10.35			1.92
		Pallas	=	35	0	42	at	10.35			6.3
		Jupiter	=	1	18	56	at	13.0			0.296
		Saturn	=	2	29	50	at	15.9			0.69
Georgian, or Herschel }	=	0	46	20	at	19.19	0.256				

It must be observed, that the subtending lines here calculated must be doubled to shew both north and south latitude; therefore the quantity of rising and falling, or of projecting and retiring with respect to the plane of the ecliptic, must be *double* the quantity above expressed.

The sun's mechanism remains yet to be explained, which,

as we have seen, consists of the train  $\frac{19}{137} \times \frac{25}{62}$  of Mer-

cury's tropical revolution =  $25^d 10^h 0' 05.223$ ; the motion is communicated thus; - on the top of Mercury's long tube is fastened the large contrate wheel of 137, which impels the pinion of 19, to which is attached the wheel of 62, which drives the small wheel of 25 on the sun's axis round in the specified period, which does not vary a quarter of a second from La Lande's last determination of the time of a rotation, as it regards a fixed point: the three last wheels with their bearing-pieces are borne by a small brass bar fastened to the top of the fixed stem of  $7\frac{1}{2}$  inches long, round which Mercury's tube revolves, which piece of mechanism is seen in its proper place near the upper P, in *fig. 3*, under the sun.

It must, however, be recollected that Mercury's tube does not revolve *equably*, by reason of its being fastened into

a point, as nearly as may be,  $\frac{1}{2}$ th of the wheel's radius out of its centre, and therefore a compensation was necessary to equalize the motion of the sun round the axis, which otherwise would have been quicker on some days than on others: this compensation was very easily effected, by placing also the large wheel of 137, as nearly as may be,  $\frac{1}{2}$ th of its radius out of its centre, but in the semicircle diametrically opposite to that of Mercury at the lower end of the tube, in order that when the apohelion tooth of Mercury's wheel is in action with its pinion, the perihelion tooth of 137 may actuate its pinion of 19, which, by reason of the excentricity of 137, must be a long pinion: thus, when an acceleration takes place in the wheel of Mercury, a retardation takes place in that of the sun, and *vice versa*, by which means the motion of the sun round his axis becomes equable, the increments of one wheel's motion balancing the decrements of the other.

The inclination of the sun's axis to a line perpendicular to the plane of the ecliptic is  $7^\circ 16'$ , and it points always to  $17^\circ 53'$  of Virgo; hence the direction in which a solar spot will move, whether ascending, descending, or horizontal, to an eye situated at the Earth, will be seen to depend upon the Earth's situation in her orbit, as she has reference to the direction of the sun's axis. The secondaries have no motions by wheelwork, because such motions would have added greatly to the complexity of the machinery, as well as have enhanced the expence.

The appendages of this planetarium are these; 1. A light rod is adapted to the Earth's stem, and extends to either of the interior planets, to shew the retrogradations, stations, and direct motions. 2. A rod with a fiducial edge, containing the mean distances marked, and having a curve piece at the remote end, applies to the sun's stem, by means of a downward bend, which rod, laid on the ecliptic circle, level with the centre of the sun, and extending with its opposite end to the sun, will serve to place the planets in their due heliocentric places in the rectification, and also to ascertain the places on any given day after they have been in motion: this rod will also serve the lecturer to point with to any part of the instrument during the lecture. 3. The handle, which is in an erect position, behind the circular wooden board, when the ecliptic is erect, has a single endless screw, seen in *fig. 5*, at S, acting with a wheel of 52 strong teeth, placed on the lower end of the annual arbor R, without the frame, so that one turn of the handle corresponds very nearly to a week. A large spiral face is also behind the circular board, removed from the brass frame LMNO, by the interposition of the moveable cross bar of mahogany EF, to which it is screwed with its centre open for the annual arbor to pass through, which carries the annual index: to the end of the annual arbor is also fixed a pinion of ten, driving a wheel of 100 round in ten years, which wheel has another pinion of ten attached to it, to drive a second wheel of 100 round in 100 years, the use of which two wheels, not seen, is to indicate the year in each succeeding century, for which the instrument at any time stands rectified, which addition assists the memory, and saves the trouble of frequent rectification. The spiral of the said face is quadruple, and is divided into the months and days of the year, taking in the 20th of February in every fourth year, like the spiral we described under our article ORRERY. The wheels for indicating the year and century lie behind the plate of the large spiral, and take their motion from the projecting arbor at R, and the figures are read through holes cut in the said plate, the hands of which are secured by screws, when set to their places. The rectification of this planetarium for a given time is attended

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attended with some trouble, and therefore, when rectified, should be guarded against the eye of curiosity. As the wheels have several of them unequal teeth, it is necessary that the aphelion teeth of each should be in action, when the planets are respectively at the aphelion points of their orbits, and that the arms should be made fast when properly placed: when the wheelwork was first put together, the wheels were marked for their places of action, to correspond to the 1st of January 1800; and if these marks be brought in contact for that time, and the arms be put to the corresponding heliocentric longitudes, turning the handle till the hands shew the present time, will always be the truest, as well as easiest way of rectifying: but should the marks be effaced, each planet's distance from the aphelion must be calculated for the time, and both the wheel and arm be placed accordingly in succession. In order to disengage the screw S at any time from the annual wheel of 52 teeth, the cross bar TU (*fig. 5.*) is pushed in, or drawn out, as the case may be, and while it moves in a parallel direction by means of its longitudinal openings, admitting the pin W and screw X to guide them, the diagonal opening V, taking the pin Y of the cock that holds the screw, draws it out of, or pushes it into the wheel's teeth, accordingly as the bar is moved from T towards U, or from U towards T, in either of which situations it may be fixed by the nut of the screw X. The arbor of the screw S is squared, so as to admit of the handle at either end of it, as may be most convenient to the lecturer's assistant, who, standing behind the machine to turn the handle, is concealed from the audience.

*The new Planetarium for equated Motions, by the Rev. W. Pearson.*—Under our article ORRERY, when describing the new orrery for equated motions in three parts, we referred the reader to our present article for that portion of it, which constitutes the planetarium at present under our consideration. This planetarium, being contrived to exhibit the mean motions, the grand equations, and all the variations of distance, as well as of velocity, in the different parts of the respective orbits, demanded a new construction, and consequently new calculations. We have already described the principle by which equated motion is produced in this machine, under the title EQUATION Mechanism, near the end of that article; and have also given an example, under our indirect method of approximation, (see Planetary NUMBERS,) of the mode of calculating wheels for the motion of Venus, when one of those wheels is not in a stationary situation, which mode applies to all the trains of this planetarium, except those of the sun and of Mercury; we must, therefore, request the reader to recur to those two articles, and to make himself master of them, before he proceeds to examine the calculations and contrivances that we now propose to present to him.

*Fig. 1.* of Plate XI. of *Planetary Machines*, presents an elevation of all the wheelwork of their proportional dimensions, and in the state of action; and *fig. 2.* gives a plan of the arm or radius vector of Saturn, which will suffice to explain all the other arms. In *fig. 1.* A B is a section of an ornamental table or stand, broken into two parts at the side A, for the purpose of bringing it into the plate; and the legs are omitted for the same reason, but may be conceived to extend downwards the requisite quantity, as represented in *Plate V.* which gives a perspective view of a similar table. Below A and B, a section of the ornamented rim of the table is seen; at C is the handle turning the horizontal arbor, C D, round in seven days, and the exterior end of this arbor carries a hand to indicate the seven days of the week, on an engraved plate attached to the side rim of the table under B.

This period of seven days is assumed as the basis of all the planetary calculations, and therefore all the motions must be traced in succession from this first moving arbor. The inner end of this horizontal arbor is supported by the cock G, screwed to the bottom of the table, and carries a pinion of 18 teeth, that drives a contrate wheel of 61 teeth placed under it, apparently without support: the axis of this contrate wheel is a piece of steel wire, nicely polished, which ascends through a thick brass tube, as high as F, under the sun, and is retained within it, by a screw entering its squared end at F. This thick tube of small bore has a shoulder-piece attached to it, which rests on the middle of the table at H, and the lower end of it is held by a large tapped nut under the table, above the wheel of 61 teeth. By this means the tube stands firmly in a vertical direction, and bears the superincumbent weight of all the wheels and arms, both which are always exposed to view. At F, on the superior squared end of the axis, or wire E F, is fixed fast, by the screw we have mentioned, the pinion 28, which drives another pinion 30 round on the inferior end of the sun's stem: the period of

this revolution, or rather rotation, is  $\frac{61}{18} \times \frac{30}{28}$  of 7 days =

$25^d 10^h 0^m 0^s$ , which is the period last determined by Lande. To the pinion 28 is attached a wheel under it of 53 teeth, by means of a connecting piece of brass tube that surrounds the steel wire, which wheel rests on the top of the brass tube, which in future we shall call the central stem, as though it were solid. The wheel of 53 drives another of 35, supported by a horizontal bearing piece that supports the sun's stem at its opposite end, as seen in the figure; and this bearing piece has a short tube soldered into it below, through which the arbor of this wheel of 35 passes, and receives a pinion of 13 at its lower end; the axis or arbor of pinion 13, and of wheel 35, is detained in a vertical position by a screw above the centre of wheel 35, but so as to allow the wheel and pinion to revolve without any shake of the arbor within the tube: this pinion of 13 drives a wheel of 73 teeth, or rather a ring with the teeth cut on the inner edge, for the sake of making its motion proceed in the requisite direction, and the period of its revolution is

$\frac{61}{18} \times \frac{35}{53} \times \frac{73}{13}$  of 7 days, or, which is the same thing, in

$\frac{28}{30} \times \frac{35}{53} \times \frac{73}{13}$  of  $25^d 10^h$ , namely, in  $87^d 23^h 14^m 36^s$ .

The ring we have described, therefore, carries the stem of Mercury, and is screwed to a circular plate of brass, the centre of which is fitted so as to turn easily round the central stem without shake. If the mean motion only of Mercury had been wanted, the wheels we have described would have been the whole that the planet would have required, but the equation of the centre required some additional wheels, which are thus applied; a little wheel of 30 teeth is attached to the sun's bearing piece, by the interpolation of a piece of brass tube, and therefore has no motion; another similar wheel lies on the circular plate of the ring and acts with it, while the axis of this second wheel of 30 passes through the plate, and takes another similar wheel, under the plate; while the plate and ring therefore revolve together in Mercury's period, the second and third wheels, of each 30, revolve together just once by means of their connection with the first or fixed wheel, round which they are carried; then this motion is communicated to a fourth similar wheel of 30, fixed to the lower end of Mercury's stem, which wheel gives Mercury a rotation on his axis in each revolution; but the stem of Mercury is cranked, as seen in the figure, and as

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the parallelism of the crank is preserved during its whole revolution, the distance of the planet will vary constantly, as well as its velocity, in the manner that has been explained under the article EQUATION *Mechanism*, above referred to. When the horizontal part of the crank is equal to double the eccentricity of the orbit, the equation will be properly represented, but the distances will be better exhibited when the said piece is equal to the simple eccentricity; there are, therefore, two holes drilled and tapped in this piece, to suit either condition, but the nearness of the planet to the sun will not allow the introduction of the correction, which most of the other planets have got, as will be presently explained.

Hitherto the usual mode of estimating the value of a common train of wheels has been adhered to, because the two trains that we have examined are so placed, as to act in the usual way in stationary positions; but henceforth we shall have to consider trains, in each of which a certain portion is placed on and carried round the sun by the very arm that is put into motion. In this construction, for a reason that will appear presently, the system of concentric tubes, contrived by Roemer, and used in the common planetarium, is impracticable, unless as many fixed tubes could be introduced between them alternately, as there are revolving ones; the motion of each inferior planet is therefore transmitted to the next superior, beginning with Mercury and ending with Georgian, so that each calculation is necessarily that of a ratio between the periods of every pair of contiguous planets taken in succession. In calculating those ratios the author had two choices, namely, of the *periodic*, and of the *synodic* revolutions; one of which, as we have shewn under the head NUMBERS for *Synodic Revolutions*, is easily convertible into the other: if the periodic revolutions had been preferred, the wheelwork must necessarily have been placed on cocks, bridges, or in other *permanent* situations; but when synodic periods are chosen, some of the wheels will require to be placed, or at least will admit of being placed on *moveable* supports; the latter revolutions were thence chosen, in order to do away the necessity of cocks and bridges, and the numbers calculated to produce synodic revolutions, by the *mode* in which they are used, produce the periodic revolutions, after an allowance is made for the precession of the equinoxes. Thus, if the tropical period of Venus be to that of Mercury as 224<sup>d</sup>.69847: 87<sup>d</sup>.96579, we shall find, by one of the methods of determining *planetary* NUMBERS, that these periods are to each other as 1553: 608 very nearly; but the numbers for the synodic period are here required; therefore let 608 be taken from 1553, and let the remainder, 945, be substituted for 1553, as one of the products for two wheels, while 608, the other product, remains unaltered; then while

$\frac{1553}{608}$  of Mercury's tropical revolution is equal to that of

Venus and also  $\frac{608}{1553}$  of Venus's tropical period equal to

that of Mercury, absolutely considered, it will be found that  $\frac{608}{945}$  of the tropical period of Venus will be the *synodic* or

relative period of the two planets, Mercury and Venus, from conjunction to conjunction, namely, 144.54 &c. days, which time very nearly corresponds to the period given in our table of mean synodic revolutions, inserted under the title NUMBERS. Now the factors composing the ratio

$\frac{608}{945}$  are  $\frac{38 \times 16}{15 \times 63}$ , or in the form of a train inverted, (be-

cause the motion is given by Mercury,)  $\frac{15}{38} \times \frac{63}{16}$ , or otherwise  $\frac{63}{16} \times \frac{15}{38}$ ; but the latter portion is equal to  $\frac{30}{76}$ , and accordingly we find  $\frac{30}{76} \times \frac{63}{16}$  the train adopted in the plane-

tarium before us. The wheel 76 revolves along with Mercury's ring, to which it is made fast, and drives a pinion of 30, revolving on a pin, or stud, at the posterior end of Venus's arm, by which it is carried; then a pinion of 16 made fast to the said pinion of 30 acts with the wheel of 63, by the intervention of a pinion 14, the office of which is merely to change the direction of motion, without affecting the velocity. The wheel of 63, however, though connected with the train in the way we have mentioned, is made fast to the central stem, by close fitting, and therefore does not move, but by its resistance causes the arm of Venus to move instead, thereby making the pinion of 14 revolve round it, and producing an effect on the motion of the train equal to what would have been produced by one entire revolution of itself. In this way the calculations made for synodic revolutions in all the other trains, produce the requisite tropical periods of all the remaining primary planets, agreeably to the table of wheelwork which we have subjoined, for the sake of abbreviating our description.

Again, the wheel 126, under the arm of Venus and made fast to it, drives a pinion of 26 and its attached pinion of 32, both which revolve on a stud on the earth's arm; and the intermediate pinion 13, being resisted by the fixed wheel of 97, revolves round it and carries the earth's arm round the sun in a solar year, as it regards the ecliptic; but as it regards Venus, in the proper synodic period of 583.9 &c. days. On the earth's arm are carried the wheels and pinions for preserving her parallelism and also for producing the moon's period, both which are effected with great accuracy: just above the said arm the wheel of 107 is fixed to the central stem, and by its resistance gives motion to the wheel 62, which again impels another wheel of 107 in a contrary direction, thereby producing true parallelism; in the mean time wheel 86, made fast to wheel 62, revolves with it on a stud, and, through the medium of a small wheel of 32, for changing the direction of motion, impels the pinion 12, with which the moon is connected. The lunation thus occasioned

is  $\frac{62}{107} \times \frac{12}{86}$  of 365.242, &c. = 29<sup>d</sup> 12<sup>h</sup> 44<sup>m</sup> 0<sup>s</sup>.4. At a

small distance below the earth's arm, and fast to it, revolves the wheel 142, impelling the pinion 28 and with it the pinion 30, resting together on a stud in the arm of Mars; while the intermediate pinion of 13, resisted by the fixed wheel 134, draws the arm of Mars round in his proper period. To the arm of Mars and not far under it is made fast the wheel 166, which impels the wheel 53, and with it the 34 attached to it, round a stud on the arm of Pallas, while the intermediate pinion 15, opposed by the fixed wheel of 154, pulls the arms of both Pallas and Ceres round with the same velocity in a period which was calculated to be a mean between the two, and as far as we yet know, is not much different from either. At the time when these periods were calculated (1806), those of Juno and Vesta had not been ascertained, nor had Vesta been discovered; but room was left during the progress of the work for their introduction, and arms were since inserted on the same tube that carries the other two arms, which may be adjusted by hand occasionally when their places are required for any particular purpose; but when the period of those little bodies are finally settled they

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they may be also represented by appropriate mechanism. Below the four arms of the little planets, and fast to their common tube, revolves the wheel 182 in the common period of Pallas and Ceres, actuating the small wheel 40 and its attached pinion 17, carried by a stud on the arm of Jupiter, while the interposed pinion of 25, taking hold of the fixed wheel 122, conducts the arm round the sun in its proper period. Again, beneath Jupiter's arm, and attached to it, revolves the wheel 126, actuating the wheels 43 and 41 round a stud on Saturn's arm; and the small pinion 11, taking the teeth of both the small wheel 41 and of the large fixed wheel 178, conducts Saturn's arm round in his due period. And, lastly, the wheel 129 under Saturn's arm moves fast to it, and drives the small wheels 39 and 28, made fast together and placed on a stud on Georgian's arm, while the intermediate pinion 20, taking the teeth of the fixed wheel 171, thereby conducts Georgian's arm through its revolution by a slow motion in its requisite time. Thus each planet, except the little ones lately discovered, from Mercury downwards, has got a train of a moveable wheel, two small wheels united together, a single intermediate pinion, and a fixed wheel; and our explanation of the mode of action of the train of Venus, will apply individually to

all the rest. Before the wheelwork was put together, it was apprehended that there would be a considerable portion of time lost in the transmission of motion through all the trains from Mercury to Georgian, when the handle should have commenced its operation, which apprehension constituted the inventor's principal objection to the theory of the construction, before the machine was put into hand; but Fidler, the workman, being forewarned of this probable imperfection, laid all his teeth so deeply into one another, that no one wheel has any shake, and the moment that the handle commences its motion, all the wheels of the machine are immediately in action, and consequently all the planets begin to move, as nearly as can be perceived, at the same time. Perhaps a more complete structure of wheelwork was never put together, to answer a similar purpose, and yet the handle moves with freedom and without any sensible jerks. Many of the wheels were at first calculated to have smaller numbers of teeth, but the nature of the construction required that the fixed wheels, and consequently some of the moving wheels, should be large, in order to guide the arms of mean motion with uniform steadiness, as well as to render all the motions contemporaneous at their commencement.

A TABLE of Tropical Periods produced by the Synodic Trains.

	D.	H.	M.	S.
The handle is assumed to revolve in	-	-	-	-
Sun's axis	$\frac{61}{18} \times \frac{30}{28}$ of seven days	-	-	-
Mercury	$\frac{61}{18} \times \frac{35}{53} \times \frac{73}{13}$ of ditto.	-	-	-
Venus	$\frac{30}{76} \times \frac{63}{16} = \frac{945 + 608}{608} = \frac{1553}{608}$ of Mercury's period =	224	16	41 56
Earth	$\frac{26}{126} \times \frac{97}{32} = \frac{1261 + 2016}{2016} = \frac{3277}{2016}$ of Venus's period =	365	5	48 39
Mars	$\frac{28}{142} \times \frac{134}{30} = \frac{938 + 1065}{1065} = \frac{2003}{1065}$ of the Earth's period =	686	22	17 11
Pallas and Ceres	$\frac{53}{166} \times \frac{154}{34} = \frac{4081 + 2822}{2822} = \frac{6903}{2822}$ of Mars's period =	1680	7	43 23
Jupiter	$\frac{40}{182} \times \frac{122}{17} = \frac{2440 + 1547}{1547} = \frac{3987}{1547}$ of Pallas's period =	4330	14	28 28
Saturn	$\frac{43}{126} \times \frac{178}{41} = \frac{3827 + 2583}{2583} = \frac{6410}{2583}$ of Jupiter's period =	10746	20	52 36
Georgian	$\frac{39}{129} \times \frac{171}{28} = \frac{2223 + 1204}{1204} = \frac{3427}{1204}$ of Saturn's period =	30589	7	18 58
Moon	$\frac{62}{107} \times \frac{12}{86}$ of 365.242 &c.	-	-	-
		29	12	44 0

In computing the exact value of each of those periods in succession, we have had no reference to the true periods as given in L. Lande's Tables, but have deduced each period from that of the preceding planet, as produced by the wheelwork, which is the only true method of appreciating the real values; and if these periods be compared to those of the planetarium made at the house of the Royal Institution, or indeed to those of any other machine, they will be found to claim a preference, as to accuracy, in many of the periods, and are inferior in none, except in those of the Earth and Jupiter; but in all the other planetaria the earth is assumed as having its period exact, and is made the standard by which the others are guided, and therefore re-

quires no calculation for particular wheels; whereas in this machine all the periods are derived from the motion of the weekly handle; and with respect to Jupiter, when the periods of Juno and Vesta are introduced, his period will necessarily be altered by the new calculations that will be introduced to complete the motions of all the primary planets.

The reader will recollect that when we explained the mode of converting a tropical calculation into a synodic train, we subtracted the denominator of the large ratio, put into the form of a fraction from the numerator; that is, we *ejecuted* unity from the value, as a compensation for the *addition* made to each revolution by the *mode* in which the wheels are

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placed to act; we have therefore, in reverſing the operation to find the value of the train for a tropical period, ſubſtituted + for —, and by this ſubſtitution have given in their loweſt terms the identical numbers that the author calculated to expreſs the ratios of the reſpective tropical periods, before they were metamorphoſed into numbers ſuitable for ſynodic trains. If we conceive, when all the planets are in motion, that the firſt mover is Georgian and the laſt the handle, which would be the caſe, if any external force were applied to Georgian's arm inſtead of to the handle, then the explanation will be obvious of the neceſſity that exiſts for *ejecting unity* out of each improper fraction, that is compoſed of the ratio of any two contiguous periods. Let us ſuppoſe Georgian's arm puſhed forward by any force in the direction of the planet's proper motion, then, by looking at the figure, we ſhall ſee that the loweſt wheel 171, which is made faſt to the central ſtem, will produce a motion in the little pinion 20, which is given again to the ſmall wheel 39, by the medium of its attached wheel 28; but wheel 39 cannot revolve without moving its fellow, or wheel 129 made faſt to Saturn's arm, therefore Saturn's arm muſt evidently have a motion from this direct action of the ſmall wheels; but the ſmall wheels in queſtion are ſupported by and carried round upon Georgian's arm; and if they did not revolve at all, by their connection with Saturn's arm they would make Saturn revolve in the ſame time with Georgian; or in other words, if pinion 20 were even detached from wheel 171, Saturn's and Georgian's arms would move as one arm, on account of the connection of the ſmall wheel 39 with the large one 129, the former being faſt to one arm, and the other to the other. Thus the arm of Georgian in each of its revolutions, *puſhes* Saturn's arm *once* round independently of the direct effect of the train, and hence the number of Jupiter's revolutions in one of Georgian was diminiſhed by *one*, when the wheelwork was calculated; which diminution ſhews the inventor's foreſight as well as ingenuity; and hence we muſt add *one* of thoſe revolutions to the revolutions ſimply produced by the train, in order to obtain the combined effect of the two ſeparate cauſes of motion.

In the ſame way Saturn's arm may be ſaid to puſh that of Jupiter once round in each of Saturn's revolutions, and ſo of the reſt till we arrive at Mercury, which is puſhed by Venus in the manner we have deſcribed, when the moving force is applied at Georgian. The ſame effect takes place when the force is applied at the handle, but on that ſuppoſition is not eaſily explicable by inſpection.

From what has now been explained, it will be perceived, that all the arms, or radii vectores of the planets, are ſo connected together, like ſo many links of a chain, that no one can move without giving motion to all the reſt, and that therefore when once rectified they will be always ſo for ſome ſpecified year or other, which may be known from the ſituation of Georgian's arm, that reſts on a roller ſupported by the large ecliptic plate ſurrounding the table; and the month will be indicated by the earth's arm, as well as the day by the index at the handle. But theſe motions of the arms, partly derived from the wheels and partly from the mutual connection of the arms themſelves, are *mean motions*, like the motions produced in the common planetarium; and it remains yet to be explained, why the inventor preferred the more complex conſtruction.

In *fig. 2.* Saturn's arm is detached, in order to ſhew how the equations and variations of diſtance are effected in all the orbits by the help of the mean motions: this arm, like Jupiter's and Georgian's, is made of wood, and gilt, for the ſake of lightneſs; but an edge-bar of braſs is ſcrewed

to it, to give it ſtrength, which is in contact with it the whole length from A to B: immediately above the centre of motion of this arm is a pulley, fixed to the central ſtem between the arm and the fixed wheel, indeed the pulley is made faſt to the under face of the wheel; then another ſimilar pulley is placed on the remote end of the arm, ſo that an endless gut, embracing both, may give motion to the pulley at B, as the arm revolves round the fixed pulley under the wheel A. Under the pulley, B, is an oblong aperture in the arm, through which the ſtud paſſes, on which the pulley revolves, and as this ſtud is tapped into a ſcrew below, a nut fixes it ſo that any degree of tenſion may be given to the gut that may be requiſite for moving the pulley, or even for ſupporting the weight of the arm's appendages. A ſhort arm, B C, is made faſt to the pulley B, and revolves with it once in each revolution of Saturn, by reaſon of the two pulleys being of the ſame dimenſions; but the motion is in a contrary direction to that of the arm; now, we have ſhewn, under our article *EQUATION Mechanism*, that if the ſhort arm, B C, bear the ſame proportion to the radius vector, or long arm A B, that the mean diſtance of the planet does to the excentricity, a point fixed at C will deſcribe an *excentric circle*, very nearly ſimilar to the real orbit of the planet, and all the variations of *diſtance* will be exhibited as nearly to the truth, as ſuch an orbit is to the true elliptic orbit itſelf; and in all the orbits of ſmall excentricity, the difference, even on a large ſcale, is hardly perceptible. But though ſuch a point would always ſhew the diſtances properly, it would produce only *one-half* of the acceleration and alternate retardation on mean motion that is due to ſuch excentricity; and doubling the ſhort arm B C, ſo as to make it give the whole acceleration and retardation, or, which is the ſame thing, the whole *equation of the centre*, would exhibit improper variations of diſtance, by giving them in exceſs by *one-half*; therefore to fulfil the two conditions of variable velocity, and of variable diſtance, the ſhort arm B C was made equal to  $\frac{2}{3}$ ds of the excentricity, or once and a half, and another ſhort arm, C D, was made to revolve round its extremity *twice*, while the arm B C revolves once, that is, twice in each revolution of the planet; this effect is produced by another couple of pulleys, one juſt double of the other, the larger one fixed faſt over pulley B, and the ſmaller over the point C, while the ſtem of the planet reſts at the point D, at the remote end of the ſecond ſmall arm; under theſe circumſtances the ſmalleſt arm C D, which is juſt one-third of the length of the other ſmall arm B C, has a direct motion, while that of the other arm is retrograde, and the effect produced by their united motions is a due representation of both the *equation* and *diſtances* in every part of the orbit. But in order that the little arms might have the proper motions imparted to them, it was neceſſary that the pulley A ſhould be fixed immoveably, which would not have been the caſe had it been inſerted on a revolving tube, and as each arm has a fixed pulley, like that of Saturn, which we have deſcribed, as well as a fixed wheel, the ſystem of concentric revolving tubes was evidently incompatible with the demands of this conſtruction. On the axis of pulley B, and under it, cloſe to the long arm, is made faſt a ſilvered circular plate, that contains the equations and latitudes of the planet, and this plate, when fixed in its due ſituation by the nut under the arm, is pointed to by a hand attached to the pulley, that revolves along with it. Thus, not only is the planet carried in its excentric path, according to the Keplerian law of planetary motion, but its equation and latitude are alſo indicated, at the ſame time that the mean motion is referred to the large ecliptic by the long arm of equable motion; ſo that the exact correſpondence between

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the construction of the planetary tables, and of the motions produced by this machine, affords the best possible illustration of the process by which the places of the planets are calculated for the Nautical Almanac, and the machine may be considered as a species of perpetual self-calculating almanac.

It is true, the planets are made to revolve all in the same plane, which, in an horizontal machine, could not well be avoided, yet the stems of those that deviate any sensible distance from the ecliptic, are composed of tubes that draw out, or push in, to the required marks made on them, by way of graduation for latitude; and therefore, as the silvered plates exhibit the quantum of latitude, north or south, at all times, it is an easy matter to draw out, or to push in, at any time, the planet's stem, till the planet stands at its due latitude, as seen from the sun, on that particular day. The proportional distances, however, of all the planets could not possibly be preserved in the lengths of the arms, and therefore the subjoined proportions were adopted, which we will give in a table that shall contain also the corresponding lengths of the second and third arms.

Lengths of the respective Arms.

Planets.	Radii Vectores.	First short Arms.	Second short Arms.
	Inches.	Inches.	Inches.
Mercury	1.54	0.62	0.0
Venus	2.9	0.0	0.0
Earth	4.0	0.0	0.0
Mars	6.1	1.14	0.0
Vesta	9.4	1.17	0.39
Juno	10.6	4.04	1.34
Ceres	11.06	1.31	0.43
Pallas	11.06	4.15	1.38
Jupiter	20.8	1.50	0.50
Saturn	$\frac{3}{4} = 28.65$	2.48	0.83
Herfchel	$\frac{1}{2} = 38.4$	2.70	0.90

From this table it will be seen that none of the planets have two small arms till we come to Vesta, and the reason is, because their mean distances from the sun are too small to admit of such addition, and also Venus and the Earth have their equations too small to require them. We might also have added a table of dimensions of the wheelwork, if there had been any difficulty in obtaining the due sizes, but as each train may have its wheels of any diameter, provided its large driving wheel be larger than its subjacent fixed one, in order to admit of an intermediate pinion of any number of teeth, the workman may fix on any dimensions that will admit of teeth to be from eight to ten *per* inch, provided those pairs which act together be duly proportioned to each other. In the trains of the Sun, of Mercury, and of Venus, where there is but little stress on the teeth, the wheels may have 14 or 15 teeth *per* inch, without any danger of injury.

In the train of Georgian the driving wheel of 129 has only about seven teeth in the inch. The wheels on the Earth's arm have their diameters limited, the distance from the sun to the Earth being exactly four inches; hence the diameter of each of the wheels of 107 teeth is 2.53 inches, that of 62, 1.47, and that of 86, 2.0, and each of them have 13.4 teeth in every inch of their geometrical circumference. The fatalities are made to move by hand, as in other planetaria, and the dimensions of the ivory balls are optional. What we have said under our article ORRERY, respecting the *rectification* of that machine, will apply to a planetarium also; we will therefore conclude our account of the present planetarium by subjoining such tables as are requisite for graduating the silvered faces that indicate the equations and latitudes of the planets, which tables will be a proper supplement to those of the sun and moon, which are before explained, and with which we concluded our article ORRERY.

TABLE I.—The angular Distances of Mercury from the Aphelion and Perihelion Points, which correspond to exact Degrees of Equation.

Ang. Dist.	Equation.	Ang. Dist.	Equation.
Aphelion	0° 0'	Perihelion	0° 0'
3° 3'.1	1 0	1° 49'.1	1 0
6 7.7	2 0	3 38.4	2 0
9 12.3	3 0	5 28.2	3 0
12 17.6	4 0	7 18.8	4 0
15 24.1	5 0	9 10.4	5 0
18 31.5	6 0	11 3.4	6 0
21 38.5	7 0	12 58.0	7 0
24 51.6	8 0	14 56.7	8 0
28 8.7	9 0	16 54.0	9 0
31 23.1	10 0	18 56.1	10 0
34 40.6	11 0	21 15.8	11 0
38 7.9	12 0	23 11.2	12 0
41 36.3	13 0	25 25.8	13 0
45 19.0	14 0	27 45.3	14 0
48 53.4	15 0	30 14.4	15 0
52 43.2	16 0	32 47.2	16 0
56 43.5	17 0	35 33.7	17 0
60 56.5	18 0	38 31.2	18 0
65 27.0	19 0	41 52.2	19 0
70 30.8	20 0	45 25.0	20 0
75 47.4	21 0	49 38.1	21 0
82 13.9	22 0	54 48.6	22 0
90 48.4	23 0	62 8.2	23 0
105 maximum	23 39 59''	75 maximum	23 32 59''

TABLE II.—Angular Distances of Venus for every Five Minutes of Equation.

Ang. Dist.	Equation.	Ang. Dist.	Equation.
Aphelion	0° 0'	Perihelion	0° 0'
6° 7'.0	0 5	6° 1'.2	0 5
12 14.0	0 10	12 6.1	0 10
18 37.8	0 15	18 19.2	0 15
25 12.3	0 20	24 46.9	0 20
32 8.7	0 25	31 36.3	0 25
39 39.5	0 30	39 15.7	0 30
48 3.5	0 35	47 19.4	0 35
58 6.9	0 40	57 16.0	0 40
72 24.0	0 45	71 28.0	0 45
91 0	0 47 20''	89 0	0 47 20''

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TABLE III.—Angular Distances of Mars for every Degree of Equation.

Ang. Dist.	Equation.	Ang. Dist.	Equation.
Aphelion	0° 0'	Perihelion	0° 0'
6° 0'.4	1 0	4° 45'.3	1 0
12 3.6	2 0	9 33.8	2 0
18 12.1	3 0	14 29.7	3 0
24 31.9	4 0	19 31.9	4 0
31 50.3	5 0	24 50.1	5 0
37 48.8	6 0	30 29.1	6 0
45 22.9	7 0	36 38.1	7 0
53 33.9	8 0	43 34.3	8 0
63 6.6	9 0	51 52.2	9 0
75 45.6	10 0	63 15.9	10 0
97 0	10 40 39"	83 0	10 40 39"

TABLE IV.—Angular Distances of Vesta for every Degree of Equation.

Ang. Dist.	Equation.	Ang. Dist.	Equation.
Aphelion	0° 0'	Perihelion	0° 0'
6° 20'	1 0	6° 0'	1 0
13 0	2 0	10 33	2 0
19 42	3 0	16 0	3 0
26 22	4 0	21 36	4 0
33 53	5 0	27 36	5 0
41 26	6 0	33 53	6 0
50 0	7 0	40 37	7 0
59 40	8 0	49 24	8 0
72 0	9 0	60 45	9 0
97 0	9 49	83 0	9 49

TABLE V.—Angular Distances of Juno for every Degree of Equation.

Ang. Dist.	Equation.	Ang. Dist.	Equation.
Aphelion	0° 0'	Perihelion	0° 0'
2° 34'	1 0	1° 20'	1 0
5 10	2 0	2 42	2 0
7 47	3 0	4 4	3 0
10 24	4 0	5 26	4 0
13 0	5 0	6 49	5 0
15 37	6 0	8 13	6 0
18 13	7 0	9 36	7 0
20 50	8 0	11 1	8 0
23 33	9 0	12 27	9 0
26 14	10 0	13 53	10 0
28 55	11 0	15 19	11 0
31 38	12 0	16 48	12 0
34 26	13 0	18 19	13 0
37 17	14 0	20 0	14 0
40 11	15 0	21 40	15 0
43 6	16 0	23 20	16 0
46 6	17 0	25 0	17 0
49 6	18 0	26 45	18 0
52 16	19 0	28 37	19 0
55 17	20 0	30 34	20 0
58 47	21 0	32 44	21 0
62 11	22 0	35 7	22 0
65 49	23 0	37 33	23 0
69 36	24 0	40 3	24 0
73 39	25 0	42 38	25 0
78 0	26 0	45 47	26 0
82 55	27 0	49 37	27 0
88 33	28 0	54 27	28 0
96 20	29 0	60 45	29 0
108 30	29 35	71 30	29 35

TABLE VI.—Angular Distances of Ceres for every Degree of Equation.

Ang. Dist.	Equation.	Ang. Dist.	Equation.
Aphelion	0° 0'	Perihelion	0° 0'
6° 53'	1 0	5° 36'	1 0
14 0	2 0	11 36	2 0
21 22	3 0	17 36	3 0
28 52	4 0	24 0	4 0
36 51	5 0	30 40	5 0
45 30	6 0	38 9	6 0
55 30	7 0	46 50	7 0
67 45	8 0	57 45	8 0
96 0	8 59	84 0	8 59

TABLE VII.—Angular Distances of Pallas for every Degree of Equation.

Ang. Dist.	Equation.	Ang. Dist.	Equation.
Aphelion	0° 0'	Perihelion	0° 0'
2° 37'	1 0	1° 28'	1 0
5 20	2 0	2 32	2 0
8 3	3 0	4 24	3 0
10 42	4 0	5 53	4 0
13 22	5 0	7 20	5 0
16 5	6 0	8 48	6 0
18 49	7 0	10 15	7 0
21 33	8 0	11 42	8 0
24 17	9 0	13 9	9 0
27 5	10 0	14 39	10 0
29 54	11 0	16 14	11 0
32 43	12 0	17 50	12 0
35 34	13 0	19 28	13 0
38 33	14 0	21 10	14 0
41 33	15 0	22 56	15 0
44 36	16 0	24 42	16 0
47 41	17 0	26 31	17 0
50 50	18 0	28 28	18 0
54 6	19 0	30 31	19 0
57 32	20 0	32 42	20 0
61 4	21 0	34 58	21 0
64 36	22 0	37 25	22 0
68 40	23 0	40 5	23 0
72 51	24 0	42 54	24 0
77 23	25 0	46 11	25 0
82 33	26 0	50 4	26 0
88 40	27 0	55 0	27 0
97 12	28 0	62 20	28 0
108 30	28 26	71 30	28 26

TABLE VIII.—Angular Distances of Jupiter for every Half Degree of Equation.

Ang. Dist.	Equation.	Ang. Dist.	Equation.
Aphelion	0° 0'	Perihelion	0° 0'
5° 31'.4	0 30	4° 53'.4	0 30
11 6.9	1 0	9 50.1	1 0
16 44.4	1 30	14 51.9	1 30
22 33.0	2 0	20 22.9	2 0
28 33.1	2 30	25 25.6	2 30
34 52.3	3 0	31 9.3	3 0
41 37.6	3 30	37 15.4	3 30
49 31.8	4 0	44 31.8	4 0
57 34.4	4 30	51 56.8	4 30
68 16.6	5 0	62 15.1	5 0
89 54.9	5 30	83 0.0	5 30
93 0	5 30 37".7	87 0	5 30 37".7

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TABLE IX.—Angular Distances of Saturn for every Half Degree of Equation.

Ang. Dist. Aphelion	Equation.	Ang. Dist. Perihelion	Equation.
° ′	° ′	° ′	° ′
4° 45'.9	0 30	4° 8'.4	0 30
9 35.4	1 0	8 18.4	1 30
14 23.6	1 30	12 31.9	1 30
19 20.4	2 0	16 50.4	2 0
24 23.8	2 30	21 16.5	2 30
29 37.8	3 0	25 53.1	3 0
35 5.6	3 30	30 43.2	3 30
40 53.0	4 0	35 52.8	4 0
47 6.7	4 30	41 29.5	4 30
54 1.0	5 0	47 46.6	5 0
62 2.1	5 30	55 9.7	5 30
72 21.0	6 0	64 51.0	6 0
94 0	6 26 41".7	86 0	6 26 41".7

TABLE X.—Angular Distances of Georgian for every Half Degree of Equation.

Ang. Dist. Aphelion	Equation.	Ang. Dist. Perihelion	Equation.
° ′	° ′	° ′	° ′
5° 40'.6	0 30	5° 3'.0	0 30
11 24.1	1 0	10 9.1	1 0
17 13.3	1 30	15 20.9	1 30
23 12.4	2 0	20 42.6	2 0
29 25.5	2 30	26 18.0	2 30
35 58.8	3 0	32 14.2	3 0
43 3.0	3 30	38 40.4	3 30
50 53.4	4 0	45 53.6	4 0
60 40.4	4 30	54 26.8	4 30
72 16.0	5 0	66 1.0	5 0
82 8.7	5 15	75 35.4	5 15
93 0	5 21 2".7	87 0	5 21 2".7

TABLE XI.—Mercury's Heliocentric Latitude for every Quarter of a Degree.

Angular Dist. Node	Hel. Lat.
° ′	° ′
2° 3'.1	0 15
4 6.4	0 30
6 9.9	0 45
8 13.9	1 0
10 18.8	1 15
12 24.3	1 30
14 30.9	1 45
16 38.2	2 0
18 47.4	2 15
20 58.5	2 30
23 11.3	2 45
25 26.2	3 0
27 43.8	3 15
30 2.0	3 30
32 37.2	3 45
34 55.1	4 0
37 27.2	4 15
40 2.7	4 30
42 48.2	4 45
45 37.5	5 0
48 39.9	5 15
51 51.7	5 30
55 17.9	5 45
59 3.5	6 0
63 18.2	6 15
68 15.9	6 30
74 41.2	6 45
90 0	7 0

TABLE XII.—Heliocentric Latitude of Venus.

Ang. Dist. Node	Hel. Lat.
° ′	° ′
4° 13'.5	0 15
8 28.8	0 30
12 46.3	0 45
17 9.1	1 0
21 38.1	1 15
26 15.1	1 30
31 3.9	1 45
36 4.5	2 0
41 33.4	2 15
47 28.7	2 30
54 9.7	2 45
62 9.8	3 0
73 19.0	3 15
90 0	3 23 35"

TABLE XIII.—Heliocentric Latitude of Mars.

Ang. Dist. Node	Hel. Lat.
° ′	° ′
7° 45'.9	0 15
15 41.3	0 30
23 55.5	0 45
33 43.4	1 0
42 30.7	1 15
54 10.7	1 30
71 4.8	1 45
90 0	1 51

TABLE XIV.—Heliocentric Latitude of Vesta.

Ang. Dist. Node	Hel. Lat.
° ′	° ′
8° 0'	1 0
16 0	2 0
24 40	3 0
33 50	4 0
44 12	5 0
57 0	6 0
78 0	7 0
90 0	7 8

TABLE XV.—Heliocentric Latitude of Juno.

Ang. Dist. Node	Hel. Lat.
° ′	° ′
4° 19'	1 0
8 39	2 0
13 3	3 0
17 32	4 0
22 9	5 0
26 56	6 0
31 56	7 0
37 16	8 0
43 2	9 0
49 26	10 0
56 52	11 0
66 19	12 0
84 6	13 0
90 0	13 4

TABLE XVI.—Heliocentric Latitude of Ceres.

Argument.	Hel. Lat.	
Node	0°	0'
5° 26'	1	0
10 54	2	0
16 29	3	0
22 13	4	0
28 11	5	0
34 30	6	0
41 20	7	0
48 57	8	0
57 58	9	0
70 14	10	0
90 0	10	37½

TABLE XVII.—Heliocentric Latitude of Pallas.

Argument.	Hel. Lat.	
Node	0°	0'
1° 44'	1	0
3 34	2	0
5 14	3	0
6 59	4	0
8 44	5	0
10 30	6	0
12 16	7	0
14 2	8	0
15 49	9	0
17 37	10	0
19 26	11	0
21 15	12	0
23 5	13	0
24 56	14	0
26 49	15	0
28 43	16	0
30 39	17	0
32 31	18	0
34 29	19	0
36 36	20	0
38 40	21	0
40 46	22	0
42 56	23	0
45 10	24	0
47 19	25	0
49 51	26	0
52 20	27	0
54 56	28	0
57 42	29	0
60 40	30	0
63 37	31	0
67 30	32	0
71 44	33	0
77 8	34	0
90 0	34	37½

TABLE XVIII.—Heliocentric Latitude of Jupiter.

Ang. Dist.	Hel. Lat.	
Node	0°	0'
10° 56.2	0	15
22 18.7	0	30
34 42.3	0	45
49 23.4	1	0
71 32.9	1	15
90 0	1	19 2"

TABLE XIX.—Heliocentric Latitude of Saturn.

Ang. Dist.	Hel. Lat.	
Node	0°	0'
5° 44.6	0	15
11 32.8	0	30
17 28.0	0	45
23 35.8	1	0
30 1.8	1	15
36 54.2	1	30
44 27.8	1	45
53 10.9	2	0
64 14.1	2	15
90 0	2	29 55"

TABLE XX.—Heliocentric Latitude of Georgian.

Ang. Dist.	Hel. Lat.	
Node	0°	0'
6° 12.5	0	5
12 29.4	0	10
18 56.1	0	15
25 37.6	0	20
32 43.5	0	25
40 25.8	0	30
49 9.7	0	35
59 50.0	0	40
76 38.2	0	45
90 0	0	46 16"

PLANETARY, something that relates to the planets.

In this sense we say, planetary worlds, planetary inhabitants, &c. Huygens and Fontenelle bring several probable arguments for the reality of planetary worlds, and animals, plants, men, &c. The former in his *Κοσμοθεωροί*, five de Terris Cœlestibus; the latter in his *Dialogues, sur le Pluralité des Mondes*.

PLANETARY Hours, in *Chronology*. See HOUR.

PLANETARY Days. Among the ancients, the week was shared among the seven planets, each planet having its day. This we learn from Dion Cassius; and Plutarch, *Sympof. lib. iv. q. 7*. Herodotus adds, that they were Egyptians who first discovered what god, that is, what planet, presides over each day; because among this people the planets were directors. And hence it is, that, in most European languages, the days of the week are still denominated from the planets; Sunday, Monday, &c.

PLANETARY Years, the periods of time in which the several planets make their revolutions round the sun, or earth.

As from the proper revolution of the sun, the solar year takes its original; so from the proper revolutions of the rest of the planets about the earth, so many sorts of years do arise, viz. the Saturnian year, the Jovial year, the Martial year. For Venus and Mercury, as their years, when judged of with regard to the earth, are almost equal to the solar year; they are more usually estimated from the sun, the true centre of their motions. See periodic times under PLANETS, *supra*; and YEAR.

PLANETARY Machines, an *Historical Account of*.—"The apparent motions of the heavenly bodies," says professor Vince, "are the most obvious phenomena in nature; and as a knowledge of the return of the seasons must always have been necessary for the husbandman, the course of the sun probably engaged the attention of mankind in the early ages of the world." Accordingly the Jewish historian, Josephus,

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Josephus, tells us, that the sons of Seth applied themselves to the study of astronomy, and engraved their observations on pillars of stone to survive the deluge; and that Abraham read lectures on astronomy to the Egyptians. Berofus, the Chaldean author, also says, that Providence prolonged the life of the antediluvians, on purpose that they might improve in virtue, and in the knowledge of geometry and astronomy, which were deemed essential to human welfare. Indeed, if we search into the history of the Chinese, Brahmins, Chaldeans, or Egyptians, we find that astronomy was cultivated by each of these nations soon after the dispersion of the human race and confusion of tongues. So much it seemed necessary to premise on the antiquity of astronomy itself, before we entered upon a detail of the different machines which have been constructed to represent the different systems which prevailed at the time of their construction; and, indeed, the histories of astronomy, and of astronomical instruments, are so intimately united, that they cannot be separated, but throw mutual light on each other.

To ascertain the date and particulars of the *first* machine which was invented for representing the motions of the heavenly bodies, is the province of the antiquarian, rather than of the cultivator of science; but as the order of *time* seems to be the most systematic to adopt in a regular description of different celestial machinery, it shall be observed, as far as the materials that we have collected will furnish an historical sketch.

The first celestial mechanism of which we have met with any intimation, is the Chinese sphere, mentioned by professor Vince in his excellent Treatise on Astronomy (vol. ii. p. 253.), which was made by Yu-chi, in the reign of the emperor Hoang-ti, in the year before Christ 2697, and which is described as having had many both moveable and fixed circles belonging to it; but with respect to further particulars, we are not in possession of any information.

The next machine that occurs is also a Chinese sphere, mentioned by Martin, in his History of China, as being made by a man of the name of Xuni, 2400 years before Christ. His words are these; "Xuni, 2400 ans avant J. C. fit faire une sphere d'or, enrichie de pierreries, ou l'on voyoit les sept planetes, et la terre au milieu:" *i. e.* "Xuni, 2400 years before Jesus Christ, had a sphere made of gold, enriched with precious stones, in which were to be seen the seven planets, and the earth in the middle." This short notice informs us what the system of the early Chinese astronomy was, and exactly accords with the account we have of the astronomical system of the Brahmins, who not only supposed the earth to be the centre of the planetary orbits, but also believed that it was placed on a mountain of gold, to which probably the golden sphere had some reference.

A third Chinese sphere is mentioned by Dr. Long in his Astronomy, vol. ii. p. 662, as having been made 2277 years before the Christian era by Chun, who, on succeeding Yao, found a great quantity of gold and jewels, of which he made a sphere that included the seven planets.

The contriver of this machine must have had the advantage of the astronomical determinations of the astronomers Hi and Ho, who about the year before Christ 2332, amongst other astronomical notices, determined that *one* year should consist of 366 days, and *three* of each 365, alternately. It will probably be said, that the emperor might have made a better use of his newly found treasure than in converting it into a sphere, but perhaps he had the circumstance in his recollection, that 2513 years before Christ, or 181 years before that time, Chueni was created emperor

of China entirely on account of having calculated an ephemeris of the motions of five planets.

We do not meet with any mention made of instruments constructed by the Chaldeans or Egyptians for representing their system of astronomy, though they cultivated astronomy very early, nor does it appear quite certain what their system was. According to the authority of Macrobius, the ancient Egyptians made the planets revolve about the earth, and reckoned the sun to be a planet, with Mercury and Venus revolving as secondaries round him; and Diodorus Siculus says, the ancient Egyptians discovered that the planets (superior as well as inferior) had sometimes a direct, and sometimes a retrograde motion, and that they were sometimes stationary. He also asserts, that they made the sun move in a circle inclined to the equator, and in a direction contrary to the diurnal motion. These accounts favour the idea, that systems, somewhat different, were adopted, either at the same time, or successively; but that a system with the earth in the centre was the prevalent one, particularly among the later Egyptians, may be thus inferred. The Alexandrian school, we believe, is universally allowed to have given the names of the planets to the days of the week, which names are yet retained in the Latin language. Philander, in his learned notes to Vitruvius, has given us two reasons for the order Dies Saturni, Solis, Lunæ, Martis, Mercurii, Jovis, Veneris, *viz.* Saturday, Sunday, Monday, Tuesday, &c. This arrangement may have puzzled many of our readers who have considered it, and who probably have not been able to find out the reason of such a succession. The first reason, says Philander, is said, in the seventeenth book of Dion, to be this: "Cum ex ultimarent Egyptii, planetarum eum esse ordinem, ut orbis summus Saturni diceretur, proximus Jovis, tertius Martis, quartus Solis, quintus Veneris, sextus Mercurii, septimus Lunæ; diatessaron harmoniæ rationem habentes, quod in eâ vis omnis musica contineretur, orbium tetrachorda septem commenti sunt, quorum singulas primas stellas singulis hebdomadis diebus assignarent. Primum tetrachordum a Saturno ad Solem concipiebant, secundum a Sole ad Lunam, tertium a Luna ad Martem, quartum a Marte ad Mercurium, quintum a Mercurio ad Jovem, sextum a Jove ad Venerem. Inde factum, ut primus dies sit appellatus Saturni, quia primi tetrachordi princeps erat Saturnus, et pari ratione secundus Solis, tertius Lunæ, quartus Martis, quintus Mercurii, sextus Jovis, et septimus Veneris:"—that is,—“As the Egyptians thought the order of the planets to be such, that the orbit of Saturn was called the highest, that of Jupiter the next, that of Mars the third, that of the sun the fourth, that of Venus the fifth, that of Mercury the sixth, and that of the moon the seventh; conceiving a certain harmonic ratio to run by *fours*, as the groundwork of music, they made seven tetrachords (as they called them) of the orbits, and assigned the first planet of each (tetrachord or space of *four* successively) to each day of the week. Thus they imagined the first tetrachord to reach from Saturn (the highest) down to the sun, the second from the sun down to the moon, the third from the moon round again to Mars, the fourth from Mars down to Mercury, the fifth from Mercury round a third time to Jupiter, and the sixth from Jupiter down to Venus. Hence it came to pass, that the first day was called Saturday, or day of Saturn; the second Sunday, or day of the sun; the third Monday, or day of the moon; the fourth (or Tuesday) the day of Mars; the fifth (or Wednesday) the day of Mercury; the sixth (or Thursday) the day of Jupiter; and seventh (or Friday) the day of Venus.”

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The other reason of this order of the planetary names of the seven days, as given by Johannes Oxiphelinus, was this: "Cum naturalis dies quatuor et viginti horis constaret, primam dabant Saturno, secundam Jovi, tertiam Marti, quartam Soli, quintam Veneri, sextam Mercurio, septimam Lunæ; rursus octavam Saturno, nonam Jovi, ac demum ad vicefimam quartam, quæ Martis eum esset, contingebat, ut proximæ diei prima esset Solis, tertix Lunæ, quartæ Martis, quintæ Mercurii, sextæ Jovis, et septimæ Veneris. Ex eo diebus hebdomadis planetarum inditum est præfidium, quos memorato ratiocinio primis horis præesse contigerat. Quem morem receperunt longo post tempore, & non ita pridem, Græci & Romani. Et revera, ut legas omnia omnium antiquorum monumenta, nunquam reperias eam dierum appellationem."—Namely: "As a natural day consists of 24 hours, they gave the first to Saturn, the second to Jupiter, the third to Mars, the fourth to the Sun, the fifth to Venus, the sixth to Mercury, and the seventh to the Moon; again the eighth to Saturn, the ninth to Jupiter, and so on till the twenty-fourth, which happening to fall to Mars, made the sun the first of the next day, the moon the first of the third day, Mars of the fourth, Mercury of the fifth, Jupiter of the sixth, and Venus of the seventh. Hence those planets to which the first hour of each day fell, by this mode of counting, were made to preside over those particular days: which mode the Greeks and Romans did not adopt till a long time afterwards, indeed not till recently: and in tracing the inscriptions of the ancients this manner of naming the days is not to be met with."

Thus have we two reasons given for the origin of the same custom, of equal authority and probability; both of which may be easily understood if we describe a circle and divide it into seven equal portions, and mark them successively with the characters ♄ ♃ ♀ ☉ ♁ ♂ ♆; for the extent from ♄ to ♃ will make the points of a pair of dividers fall successively thus, ♄ ☉ ♁ ♂ ♁ ♃ ♆, which are in the same order of succession, as the days of the week which they respectively represent; also if, according to the second reason given, we begin with ♄ and count to 24, the first of the next 24 will be ☉, and of the next 24 ♁, and so of the rest.

Whichever of these reasons was the original one for thus designating the days of the week, it is equally evident *what* the Egyptian system was at the period this astronomical nomenclature was assigned; the earth was evidently placed in the centre, and the sun was considered as a planet revolving round it in a year; and it is worthy of remark that Saturday, which was the Jewish sabbath, was made the first instead of the seventh day of the Egyptian week.

Perhaps we shall be pardoned the short digression, if we should remark here, that a natural and easy solution presents itself, from a consideration of the Chaldean and Egyptian system of astronomy, of the difficulty of those passages of scripture, which relate to the motion of the sun, and which have been used to countenance the cavils of some of our modern Deists: in Joshua, chap. x. verses 12, 13, it is said that the sun and moon stood still for the space of a whole day; and in the prophet Isaiah, chap. xxxviii. v. 8. it is said, that in order that the shadow might go back on the dial of Ahaz, "the sun turned ten degrees backward, by which degrees it was gone down;" and again in the second book of Kings we read, chap. xx. v. 11. the Lord "brought the shadow ten degrees backward, by which it had gone down in the dial of Ahaz." The objection to these passages has been that they attributed a motion to the sun which is not agreeable to the true solar or Copernican system, as now

unquestionably established; the answer to which, and in our opinion a complete answer, arises out of the system at present before us: which is this, that at the time when these passages were written, the prevailing system was, that the sun actually moved as the fourth or middle planet, once round the earth as its centre, from west to east in a year, and also, in common with all the other planets, moved along with their primum mobile once round from east to west in 24 hours: if, therefore, scripture had said that to produce the effect in question, "the rotation of the earth on its axis was suspended for a day," or that "the earth turned backward on its axis ten degrees," such language would have been *unintelligible* to the people of that remote age, who knew not that the earth was a planet, nor yet that she has a rotation on her axis, to produce the changes of day and night; the expressions, consequently, in this, as in all other instances that we know of, were suited to the *apprehensions* of the people to whom they were addressed, and were on that account sufficiently expressive of the magnitude of the miracles which were performed by divine agency, for purposes of importance sufficient to justify our credence of the facts related:

If it should be here objected, that in one of the passages quoted, it is said that the *shadow* went back *ten degrees*, and that in another of them it is said, the *sun* went back *ten degrees*, whereas in dials in general the degrees on the face do not correspond in each hour, nor indeed in any hour, to the degrees of the sun's apparent motion in the heavens, our further answer is, that in equinoctial dials, which were the earliest, as well as most simple, and the easiest to make, the degrees on the dial-plate do exactly accord in number with the degrees of the ecliptic; until, therefore, it has been shewn, that the dial of Ahaz was not an equinoctial dial, the objection will not apply: on the contrary, there are other reasons besides the above for supposing that it was an equinoctial dial, one of which will suffice to mention, which is this: when Vitruvius is speaking (chap. iv.) of the origin of sun-dials, he says, "Ea autem sunt divina mente comparata, habentque admirationem magnam, considerantibus, quod umbra gnomonis æquinoctialis alia magnitudine est Athenis, alia Alexandria, alia Romæ, non eadem Placentiæ, cæterisque orbis terrarum locis."—"These things are comprehended by minds which are as it were divine, and afford much admiration to those who consider them, because the shadow of an *equinoctial gnomon* is different in length at Athens, at Alexandria, at Rome, at Placentia, and at other parts of the world." This extract serves to shew that the equinoctial dial was generally known in Egypt, Greece, Rome, and other parts of the globe before the time of the Romans. It was, indeed, an attentive observation and measurement of the length of the shadow compared with the height of the gnomon of a dial, which led to a knowledge, amongst other things, of the obliquity of the ecliptic with respect to the equator, in very early ages; and it is by comparing more modern observations on the sun's place, when crossing the equator, with ancient determinations effected in this manner, that later astronomers have been enabled to determine not only the annual precession, or rather retrocession of the equinoctial points, but have thereby very nearly ascertained the period in which some of the ancient astronomers flourished, and also the authenticity of many historical facts.

From Egypt, it is generally understood, that Thales of Miletus first introduced a knowledge of the circles of the sphere, and the causes of solar and lunar eclipses into Greece, about six centuries before the Christian era, and that he calculated

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culated an eclipse, probably from the assistance of the *Chaldean Saros*, which was a period of 223 lunations, or 6585½ days for the revolution of the nodes, from which a lunation was determined to be 29<sup>d</sup> 12<sup>h</sup> 44<sup>m</sup> 7<sup>n</sup>, which is only about 4" above the period that our best tables are calculated from.

Very soon after this time Anaximander, the scholar of Thales, who died in 547 A. C., taught that the earth was a sphere placed in the centre of the world, and that the moon borrows her light from the sun. Pliny says that he first discovered the obliquity of the ecliptic, but this must be a mistake, as we have before seen, that it was known to the Egyptians, unless, indeed, we discredit the authority of Diodorus Siculus; the invention of the sun-dial has also been attributed to him, but this is equally doubtful: he might probably be the first who made one in Greece.

A short time after Anaximander, Pythagoras of Samos became famous for his knowledge of astronomy, which he gained from the priests in Egypt; it is generally said that he placed the sun in the centre of the system, and laid the foundation of the Copernican system, but Laertius affirms that the system he held was, "that the earth was in the centre, with a diurnal motion, in the next place the moon, then the sun, and then the orbits of the planets." His disciple, however, Philolaus of Crotona, about the year 450 B. C. placed the sun in the centre, with the earth and other planets revolving round him; and soon afterwards Hicetas of Syracuse gave the earth a diurnal motion; and Plutarch says, that Pythagoras in his old age repeated that he had not given to the earth its proper place. We might mention other names of men who contributed to the advancement of astronomy, if it did not interfere too much with our plan; but we must not omit to mention here Eudoxus of Cnidus, who was a scholar of Plato, and who, about 360 years B. C., made not only a sun-dial, but also a sphere or globe, with the constellations marked on it, as Chiron the centaur is said by fabulous history to have done before. According to Seneca, it was he who brought the hypothesis of the motions of the five planets out of Egypt into Greece.

About 300 years before Christ, Euclid of Alexandria wrote his admired treatise on geometry, which paved the way for astronomical calculations; and about a century after him the celebrated Grecian mathematician Archimedes, not only wrote a description of the sphere, but actually constructed one, in which, it should seem from the account of the Roman poet Claudian, the sun, moon, and planets had their respective motions, which they were at that time supposed to have in the system of nature, and that the globe which surrounded these moving bodies was made of glass, and had the constellations depicted on its surface: and as Archimedes had invented an engine for raising great weights by wheelwork, there can be no doubt but that wheels and pinions were introduced in his sphere to produce the respective motions. The description alluded to is this; *viz.*

" Jupiter in parvo cum cerneret æthera vitro,  
Risit, et ad superos talia dicta dedit:  
Hucine mortalis progressa potentia curæ!  
Jam pelus in fragili luditur orbe labor.  
Jura poli, rerumque fidem, leges que Deorum  
Ecce Syracusius transtulit arte senex.  
Inclusus variis famulatur spiritus astris,  
Et vivum certis motibus urget opus.  
Percurrit proprium mentitus signifer annum,  
Et simulata novo Cynthia mense redit:

Jamque, suum volvens audax industria mundum,  
Gaudet, & humanâ fidera mente regit.  
Quid falso infontem tonitru Salmoneæ miror?  
Emula naturæ parvo reperta manus."  
Epig. in Sphær. Archimedis.

As the translation which Dr. Derham has annexed to this quotation is not remarkable for its elegance, we beg leave to substitute the following:

" When Jove beheld in glass his heaven made,  
He laugh'd, and to the deities thus said:  
That human power and art should so succeed  
With brittle orb, to imitate my deed!  
Behold! that aged Syracusan's skill  
Has made the very skies obey his will.  
An hidden spirit guides, by certain laws,  
Each animated planet as it goes.  
The sun, well feign'd, his annual circuit makes;  
And Cynthia too her monthly journey takes:  
Man now by industry too bold is grown,  
With joy who dares to make the world his own.  
Why wonder at Salmoneus' dreadful lot?  
Since nature's artist has a rival got."

The poet could not better express his admiration of the mechanism in question, than by supposing Jupiter more enraged at the sight of it, than he was at the king of Elis, who imitated his thunder by driving a chariot over a brazen bridge, and by throwing down burning torches at the same time instead of lightning; for which presumption, the story is, that he was hurled headlong by a thunderbolt into the infernal regions: but when we consider that the "hidden spirit" which actuated the various motions was probably a *dead weight*, his incensed majesty had not much reason to be jealous in either instance. Besides the above authentic account of the sphere of Archimedes, we have the two following notices of the Roman orator Cicero; the first is in the Tusculan Questions, where, as an argument to prove the divine nature of the soul (lib. i.) he introduces the contrivance of Archimedes thus: "Nam cum Archimedes lunæ, solis, quinque errantium motus in spheram illigavit, effecit idem, quod ille, qui in Timæo mundum ædificavit Platonis deus, ut tarditate, et celeritate diffimillimos motus una regeret conversio. Quod si in hoc mundo fieri sine deo non potest, ne in spherâ quidem eisdem motus Archimedes sine divino ingenio potuisset imitari." In English thus; "For when Archimedes connected together in his sphere the motions of the moon, sun, and five wandering stars, he effected the same thing which that god did in Timæus, who built Plato's world in such a manner, that one revolution of it produced motions very dissimilar in slowness and quickness. But if this thing cannot be effected in that world without the aid of a god, neither could Archimedes in his sphere imitate similar motions without a divine genius." And again, in his second book "de Natura Deorum," Tully says, when speaking of the philosophers of his age, "Archimedes arbitrantur plus valuisse in imitandis spheræ conversionibus, quam naturam in efficiendis," *i. e.* they imagined that "Archimedes could better imitate the motions of the sphere than nature could keep them in motion." Such was their veneration of that great philosopher and mechanic.

If we pass over sun-dials which were constructed in very early ages, and clepsydræ or water-clocks, (the invention of which has been attributed by Pliny to P. Cornelius Nasica, 150 years before Christ, but by Vitruvius to Ctesibius

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buis about the same time,) we find no machine or instrument representing the motions, or measuring the periods, of any of the heavenly bodies, till nearly eighty years before the Christian era, when Pofidonius made a sphere which seems to have been similar to that of Archimedes. Cicero's description of it, in his second book "de Natura Deorum," is this; "Quod si in Scythiam, aut in Britanniam, spheram aliquis tulerit hanc, quam nuper familiaris noster effecit Pofidonius ejus singule conversiones idem efficiunt in sole, & in luna, & in quinque stellis errantibus quod efficitur in cælo singulis diebus & noctibus; quis in illâ barbaric dubitet, quin ea spherâ sit perfectâ ratione?" In English thus; "If any one should convey into Scythia or into Britain this sphere which our friend Pofidonius lately constructed, the revolutions of which produce the same effect in the sun, moon, and five planets, as they experience in heaven; who is there in the midst of such barbarity, who could doubt that this sphere is perfected by the operation of reason?"

It is the opinion of Ferdinand Berthoud, a French author, who has written many books on the different branches of clock-work, that this sphere, like that of Archimedes, had wheels and pinions, but that it was put in motion by a water-clock, which kept it going day and night; and to rescue our own country from the imputation of *barbarous ignorance* at the age in question, it is grateful to the feelings of an Englishman to be told, by the same author, speaking of clepsydre, (Histoire de la Mésure du Temps, tome i. p. 20, 21.) that "Cæsar les trouva même en Angleterre, lorsqu'il y porta ses armes. Cet instrument nouveau lui donna lieu d'observer que les nuits de ce climat étoient plus courtes que celles d'Italie." *i. e.* "Cæsar found them, even in England, when he carried his arms thither. That *new* instrument gave him an opportunity of observing that the nights of that climate were shorter than those of Italy." It must have been in summer that this observation was made by Cæsar, otherwise the result would have been just the reverse.

Besides the spheres above named, Dr. Derham says that Cardan mentions another belonging to Sapor, king of Persia, in the middle of which his majesty could sit, and see all the stars rise and set, though it was made of glass; but whether this was the same Sapor who was contemporary with Constantine the Great, is uncertain; nor is it known what wheelwork or planetary motions belonged to it, nor yet what system of astronomy was the groundwork of the calculations, if there were any.

What the system of the Romans was may be collected from their writings, particularly those of Vitruvius and Tully in his dream of Scipio. The former describes it very minutely in these words; (de Architectura, lib. ix. cap. 4.) *viz.* "Signa cum sint numero xii, partes que duodecimæ singula possident mundi, versantur que ab oriente ad occidentem continentur, tunc per ea signa contrario cursu Luna, stella Mercurii, Veneris, ipse Sol, item que Martis, et Jovis, et Saturni; ut per graduum ascensionem percurrentes, alius aliâ circuitiois magnitudine ab occidente ad orientem in mundo pervagantur. \* \* \* Mercurii autem et Veneris stellæ, circum solis radios, solem ipsum, uti centrum, itineribus coronantes, regressus retrorsum et retardationes faciunt."

"There are twelve signs, occupying each a twelfth part of a circle of the world, and turning round continually from east to west; then through these signs, in a contrary direction, run the Moon, Mercury, Venus, the Sun, Mars, Jupiter, and Saturn, moving, as it were, along an ascent

of steps, each in an orbit of a different size from west to east. \* \* \* But Mercury and Venus moving round the rays of the sun, and considering the sun himself as their centre, make retrograde motions, and experience a diminution of velocity."

Tully's account, which is in a more ornamental style, runs thus (M. Tul. Cic. Somnium Sciponis): "Extimus (orbis) qui reliquos omnes complectitur, summus ipse Deus, arcens et continens cæteros; in quo infixi sunt illi, qui voluntur, stellarum cursus sempiterni; cui subiecti sunt septem, qui versantur retrò, contrario motu, atque cælum, ex quibus unum globum possidet illa, quam in terris Saturniam nominant. Deinde est hominum generi prosperus et salutaris ille fulgor, qui dicitur Jovis: tum rutilus horribilis que terris, quem Martium dicitis: deinde subter medium fere regionem Sol obtinet, dux et princeps, et moderator luminum reliquorum, mens mundi, et temperatio, tantâ magnitudine, ut cuncta sua luce illustret et compleat. Hunc ut comites consequuntur alter Veneris, alter Mercurii cursus; in infimo que orbe luna, radiis solis accensa, convertitur. Infra autem jam nihil est, nisi mortale et caducum, præter animos generi hominum munere deorum datos. Supra lunam sunt æterna omnia. Nam ea, quæ est media et nona, tellus, neque movetur, et infima est, et in eam feruntur omnia suo nutu pondera."

"The outermost (orb) which surrounds all the rest, is the great God, impelling and holding together all the rest; within which (orb) the eternal courses of the stars, which roll along, are fixed; under this are seven others carried backwards by a motion, contrary to that of heaven, one of which has a globe, called on earth Saturnia. Next is that luminary which is propitious and salutary to man, called Jupiter: then that ruddy and horrible one, which is denominated from Mars; after that, and nearly in the middle region, is the sun, the prince and guide, as well as ruler of all the other luminaries, the mind and regulating power of the world, of such magnitude as to illuminate and fill all places. The courses (or orbits) of Venus and Mercury follow him as his companions; and the moon, lighted by the rays of the sun, is carried round in the lowest orb. Below her is nothing but what is mortal and frail, except the minds of men, which are the gift of the gods. Above the moon all things are eternal. For this Earth, which is the middle (or centre), and the ninth in order, does not move, and is the lowest; and towards it are voluntarily carried all ponderable bodies."

We could produce further accounts of this system from Pliny, Martianus Capella, and Cassiodorus, if more were deemed necessary for our purpose; but we have perhaps already dwelt too long upon the accounts of heathen authors to be consistent with our plan, of giving only a history of planetary machines; we will therefore subjoin only one further remark with respect to these authors and their system, which is, that many of our words, particularly epithets, are evidently taken from this order of the planets, and owe their original signification to it; such are the words *supernal*, *infernal*, *superior*, *inferior*, *sublunary*, *solstice*, *sun's path*, *ascension*, *descention*, *declination*, and others which we still retain, notwithstanding we have placed the sun in the centre, and made the earth a planet to describe the same orbit which was formerly attributed to him.

It being then probable, that, as the ancient Egyptian was the prevailing system on the continent before and for some time after the Christian era, the machines which were invented before and about that memorable period, were contrived to exhibit *diurnal*, as well as contrary *annual* revolutions

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tions of all the planets, except of Mercury and Venus, which planets were made to revolve as secondaries to the sun, or second planet in order from the centre; the moon being the first: such a system would exhibit the phenomena relating to the sun, Mercury, Venus, and moon very well, but would not give a representation of the retrogradations of our superior planets.

Ptolemy, who died about 138 years after the commencement of the Christian reckoning, saw the difficulty of explaining the retrogradations of the superior planets by the Alexandrian system, and therefore devised the circles and epicycles that distinguish his system, in order to account for the apparent irregularities of the planetary motions; and though he probably could not construct a machine to represent the said motions exactly, yet in his *Almagest* is described a sphere, with the constellations depicted thereon, to which he could refer the apparent paths of the heavenly bodies, and by which he could explain his system.

From the time of Ptolemy to the sixteenth century, in which Copernicus revived the system of Philolaus, or as is generally said of Pythagoras, the machines which were constructed we must suppose represented the Ptolemaic system, which, like the Egyptian, placed the earth in the centre, but supposed the moon and planets all separately revolving round it every day, whilst they slowly performed periodic cycles and epicycles, to account for the stationary and retrograde appearances, that could not otherwise be explained. The most ancient machine of which we have met with any account during this period is that of Chromatius, the governor of Rome, in the third century, which is mentioned in the first volume of Beckmann's "History of Inventions and Discoveries." According to the accounts of St. Sebastian and St. Polycarp, this costly piece of mechanism consisted of a pavilion of glass, in the construction of which were consumed two hundred pounds weight of gold, as materials for the workmanship; and all the heavenly bodies were represented by mechanism, together with the change of the phases of the moon: there appears to have been also an ecliptic circle divided into signs. But whatever the particular construction of this machine may have been, it was lost to posterity by the violent hands which the saints laid upon it, either on account of the valuable materials of which it was constructed, or by reason of some supposed impiety attached to such a representation of the heavens. St. Sebastian represents Chromatius as speaking thus; "Habeo cubiculum holovitreum, in quo omnis disciplina stellarum ac mathesis mechanicæ est arte constructa in cujus fabricâ pater meus Tarquinius amplius quam ducenta pondo auri dignoscitur expendisse," *i. e.* "I have a chamber of glass, in which all the knowledge relating to the stars is laid down by mechanical contrivance, in the construction of which my father Tarquin is known to have consumed more than two hundred pounds weight of gold:" to which St. Sebastian answers, "Si hoc tu integrum habere voveris teipsum frangis," *i. e.* "if you wish to preserve this entire, you ruin yourself;" to which Chromatius replies, "Quid enim? mathesis aut ephemeris aliquo sacrificiorum usu coluntur, cum tantum eis mensium et annorum cursus certo numero per horarum spatia distinguuntur? Et lunaris globi plenitudo, vel diminutio, digitorum motu, rationis magisterio, et calculi computatione preveditur?" (*A. S. Sanc. Seb. cap. 16.*) *i. e.* "But why? this knowledge of the daily motions, is it not useful for the observance of the sacred rites, seeing that the lapse of months and of years is distinguished by the passage of a certain number of hours? And are not the increase and decrease of the lunar globe foreseen by the motion of indexes, guided according to certain calcula-

tions?" St. Polycarp, speaking of the same mechanism, uses these words; "Illic signa Leonis, et Capricorni, et Sagittarii, et Scorpionis, et Tauri sunt; illic in Ariete Luna, in Cancro hora, in Jove stella, in Mercurio tropica, in Venerè Mars, et in omnibus istis monstruosis dæmonibus ars deo inimica cognoscitur:" that is, "There are the signs of Leo and of Capricorn, of Sagittarius and of Scorpion, and of Taurus; there are the moon in Aries, the hour-hand in Cancer, a star in Jupiter, the tropic in Mercury, in (or with) Venus Mars; and in all those monstrous dæmons is discovered an art hostile to the Deity."

The next instrument in the order of time which occurs in our research, is that which was contrived by Y-tang, the celebrated Chinese astronomer, in the year 721, and which merited the admiration of his contemporaries. Berthoud (tome i. p. 38, and tome ii. p. 178, 179, *Histoire de la Mésure*;) speaks of this instrument in the words of father Gaubil, thus: "L'eau faisoit mouvoir plusieurs roues; et par leur moyen, ou representoit le mouvement propre, et le mouvement commun du soleil, de la lune, et des cinque planetes; les conjonctions, les oppositions, les éclipses du soleil et de la lune; les occultations des etoiles et des autres planetes."—Which account in English may be thus; "Many wheels were put in motion by water, and by their means were represented both the proper and common motions of the sun, moon, and five planets; the conjunctions and oppositions, the eclipses of the sun and moon, and occultations of the stars, as well as of the planets."—By the proper and common motions, we conceive, we must understand the apparent or supposed diurnal motion of the planets round the earth, as well as their progressive motions in the ecliptic, and also the lunation and motion of the moon's nodes. For it is said, moreover, that this instrument exhibited, by two pointers, the *hours* of the day and night, and also the *ke*, or hundredth part of the Chinese day; and it may be worthy of remark here, that at every return of the index to the *ke* a little wooden statue stepped forth, and gave a blow on a wooden board, and then retired; which probably was the origin of *striking* clocks; but what was the regulator of this early horological, as well as astronomical machine, does not appear.

We must now pass on to the eleventh century, in which William, the learned abbot of Hirscham, is said "to have invented a natural horologe in imitation of the celestial hemisphere;" (naturale horologium ad exemplum cælestis hæmisperii excogitasse;) but this short notice conveys no exact idea of the construction of this piece of mechanism.

The next machine that we find described is an *horologium*, which, Trithemius says, was presented to the emperor Frederic II., of Germany, by one of the sultans of Egypt, in the year 1232: his description is as follows. "Saladinus Egyptianorum Frederico Imperatori dono misit per suos oratores tentorium pretiosum, mirabili arte compositum, cujus pretii æstimatio quinque ducatorum millium procul valorum excessit. Nam ad similitudinem sphærarum cælestium intrinsecus videbatur constructum, in quo imagines solis, lunæ, ac reliquorum planetarum artificiosissimè compositæ movebantur ponderibus et rotis incitatæ; ita videlicet, quod, cursus suum artis ac debitis spatiis peragentes, horas tam noctis quam diei infallibili demonstratione designabant; imagines quoque xii signorum zodiaci certis distinctionibus suis motæ cum firmamento cursum in se planetarum continebant."—"The sultan of Egypt presented to the emperor Frederic, by his orators, a valuable tent (or pavilion), constructed with admirable art, the value of which has been estimated at more than five thousand ducats. For its appearance within represented the celestial spheres, in which were the representa-

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representatives of the sun, moon, and the rest of the planets, most ingeniously made and actuated by means of wheels and weights; so that, performing their courses in certain fixed periods, they designated the hours both of night and day with infallible clearness; the shapes also of the twelve signs of the zodiac distinctly moving along with the firmament, contained upon them the paths of the planets." Here it may be observed the sun and moon are reckoned among the primary planets, according to the Ptolemaic system: and if this horologium was an astronomical clock going by wheelwork, by the power of an appended weight, we think it may be considered as the first of which we have had any description handed down to us: we are at a loss, however, to know what was the *regulator*, if it had any; and also whether the *time* indicated was really *contemporary* with the earth's motion on its axis, (their supposed diurnal motion of the sun,) or only a nominal or *relative* time, many days of which might pass in a short period, when the machine was in quick uncontrolled motion.

Next in order comes an astronomical machine or clock, made by Richard of Walingford, abbot of St. Alban's, in the fourteenth century, which was called Albion (all by one). Leland speaks of the inventor and instrument thus: *viz.* "Electus in monasterii præsidem — cum jam per amplas licebat fortunas, voluit illustri aliquo opere non modo ingenii, verum etiam eruditionis ac artis excellentis miraculum ostendere. Ergo talem horologii fabricam magno labore, majore sumptu, arte vero maxima compegit, qualem non habet tota, meâ opinione, Europa secundam; sine quis cursum solis ac lunæ, seu fixa sidera notet, sine iterum maris incrementa et decrementa, seu lineas una cum figuris ac demonstrationibus ad infinitum pene variis consideret."—"After being elected abbot, now that his fortune would permit, he wished to give proof, by some illustrious work, not only of his ingenuity, but of his learning also, and skill in the arts: he therefore constructed by great labour, and still greater expence, with uncommon skill, such a machine as, in my opinion, cannot be equalled in all Europe, whether you regard the course of the sun and moon and fixed stars, or you take into consideration the ebbing and flowing of the sea, and the almost infinite variety of lines and geometrical demonstrations." Nearly about the same time John, son of James Dondi, afterwards called Horologius, made a machine similar to the foregoing, which is thus described by Petrus Paulus Vergerius. "In quo erat firmamentum & omnium planetarum sphaera, ut sic fiderim omnium motus, veluti in cælo, comprehendantur; festa edicta in dies monstrat, plurima que alia oculis stupenda; tantaque fuit ejus horologii admiranda congeries, ut usque modo post ejus relictam lucem corrigere, & pondera convenientia assignare sciverit astrologus nemo. Verum de Franciâ nuper astrologus & fabricator magnus, fama horologii tanti ductus, Papiam venit, plurimis que diebus in rotas congregandas elaboravit; tandem que actum est, ut in unum, eo quo decebat ordine, composuerit, motum que ut decebat dederit:" that is to say, this is a machine, "in which the firmament and spheres of all the planets, together with the motions of all the stars, are contained exactly as in heaven; it points out the festivals and other wonderful things; and so great and admirable was the structure of this horologe, that after his (Dondi's) death, no astrologer could rectify, or assign the proper weights to the different parts. At length, however, an astrologer and famous mechanic of France, attracted by the report respecting such an horologe, came to Pavia, and after many days labour collected the wheels, and put them into such order, as to produce the requisite motions."

The next instrument which we meet with is the famous

astronomical clock at Strasburg, made in 1370, an account of which is given by Conradus Dasypodius in a German book, (Jac von Königshovens *Elfafs and Stralß.-Chronik*, p. 574.) which we have not at present before us.

Again, John Werner of Nuremberg, that eminent astronomer and geometer, who first proposed the lunar method of discovering the longitude, about the year 1500 employed Andrew Heirlin, an excellent mechanic, to construct a machine which represented by wheelwork the Ptolemaic system (Doppelmayr de *Mathemat. Nurem.*); but we are not in possession of a more particular account of this machine.

Hitherto we have been able to collect only an historical sketch of astronomical mechanism, as it is connected with the progress of astronomy, without knowing the precise disposition of the parts, or the numbers into which the wheels were divided which produced the various motions; but imperfect as it is, it will furnish us with a proof, that in all ages of the world, a representation of the system of the universe by mechanism has not only been deemed worthy of the efforts of the greatest geniuses, but has been considered as the most arduous and wonderful undertaking.

In coming down nearer to our own time, we propose to admit into our account notices of those machines only, of which we can describe some or all of the powers and properties from authentic sources of information, and concerning which, therefore, we may be able to make appropriate remarks.

The first machines of modern construction that offer themselves to our notice, are the planetary clocks of the late Mr. Peckitt, of Compton-street, London, and the turret clock at Hampton-Court, in both of which are solar and lunar trains of wheelwork; but we have already described those under our article *CLOCK*, and the latter at considerable length; to which we therefore refer our readers for further information.

Next in order after these we may place the famous planetary clock invented by Oronce Finée, mathematician to the kings Francis I. and Henry II. of France, begun in 1553, and made, during the space of seven years, by the best workmen that could be found: this machine was presented to the cardinal du Lorraine, and is at present placed in the library "de Sainte Geneviève," or Pantheon at Paris. The exterior shape of this machine is represented as a pentagonal column, seventeen inches diameter and six feet high, surmounted by a brass celestial globe of seven inches diameter, which contains 48 constellations, and which revolves once in every 24 hours from east to west. The interior part of this pillar contains upwards of one hundred wheels to give the respective motions to the sun, moon, and planets, which are actuated by clockwork, and the whole are kept in their respective motions by one weight suspended within the pillar, the fall of which is one foot *per* day, and the motions continue 48 hours and upwards. The movement of each planet consists of twelve, ten, or eight wheels, as the necessary accuracy requires, and they are all made of Spanish steel and actuated by one common arbor. The description of this elaborate instrument is contained in a printed *recueil*,

N<sup>o</sup>  $\frac{V}{68}$ , of the library at the Pantheon, Paris, in which it is said,

that the increase and decrease of velocity is somehow effected by the mechanism in the motion of the heavenly bodies, which are represented, together with the eccentricities and motions of the apogees, nodes, and latitudes of each. The five plain sides of the pentagonal column have each a brass face of two feet in length, and ten inches in breadth, in each of which are two circles, the upper and the lower, except in that

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that containing the places of the sun and moon, which has three circles; and hands or pointers are made to indicate the different motions on the respective d'or moulu dials or circles, which are appropriated according to the subjoined arrangement, *viz.*

*Faces.*—1. The motion of Saturn above, and of Jupiter below.

2. The motion of Mars above, and of Mercury below.

3. The motion of Venus above, and of the sun below.

4. The motion of the moon above, and of the moon's node below.

5. The hours above, an astrolabe below, and in the middle the conjunctions, oppositions, eclipses, &c. of the sun and moon.

The wheelwork and other mechanical parts of the instrument are not contained in Berthoud's extract, whence this detail is abridged; but the times of the various revolutions attributed to the movements, and also to the celestial bodies themselves, which are said to be represented to a minute in a revolution, are given in the subjoined table.

Planets.	Whole Periods.				Motion in 24h.
	D.	H.	M.	S.	
Mercury -	87	23	15	36	0 59 8
Venus - -	224	17	53	2	0 59 8
Sun - -	365	5	48	15	0 59 8
Mars - -	686	23	31	56	0 31 26
Jupiter -	4332	14	49	31	0 4 59
Saturn -	10759	4	58	25	0 2 1
Moon -	27	13	18	35	13 3 54
Ditto synodic	29	12	44	3	13 8 35
Ditto nodes -	19 years				

This machine does not exhibit to the eye the representatives of the planets in their orders and distances, but only indicates on the different faces the periods of their sidereal revolutions; the earth is considered by the inventor as the centre of the orbits of the Moon, Sun, Mars, Jupiter, and Saturn, the three last of which are made to move in the Ptolemaic epicycles; but the planet Sol, or sun, is made the centre of the orbits of Mercury and Venus, according to the Egyptian system, which is the reason why the daily progress in the ecliptic is put down for these three alike. It is somewhat remarkable, that this arrangement is not according to the Copernican system, though Copernicus had published his book called the "Revolutions of the celestial Orbs," which laid the foundation of his system, twelve years before; hence we must suppose, either that the book had not found its way from Prussia into France at that time, or else that the system at first met with opposition. Thus an union of the Ptolemaic with the old Egyptian system became the favourite of the astronomer before us, and three years afterwards he published a book in defence of this theory. This machine, then, still in existence, is a standing proof of what has been asserted of the nature of the old original system described by Vitruvius and Cicero, so far

as relates to the inferior planets; and it is highly worthy of remark, that the sidereal periods of our superior planets are nearer the periods according to La Lande, than Dr. Halley gives them, who wrote more than a century after him, and whose astronomical tables were long held in the highest estimation. That the period of Mercury and Venus should not be so accurate, we need not be surpris'd, when we consider that they are made secondaries to the sun; nor can we wonder that there is no distinction made between a tropical and a sidereal year; but we think it certainly surpris'ing, that both the anomalistic and synodic revolutions of the moon are agreeable to the present state of our knowledge of the lunar motions as nearly as may be. As telescopes were not invented at the period we are now treating of, the secondary planets of Jupiter and Saturn were out of the question; but it appears evident from the mechanism before us, that the *mean motions* of those primary planets, which were known two centuries and a half ago, were then determined with that degree of accuracy, which left more modern astronomers little more to do in practical observations, with respect to them, than to contrast their present places with ancient determinations, and so to correct the inaccuracies which have necessarily arisen from want of good instruments of observation.

*Planetarium of P. Schirleus de Rheita.*—The next machine we meet with is the planetarium of P. Schirleus de Rheita, described in the "Technica Curiosa" of Schott, and made about the year 1650. This machine is said to have represented all the true and mean motions of the planets, their stations, and direct and retrograde appearances, without epicycles or equations, and with very few wheels by the help of endless screws and pulleys. The movements were actuated by water, and on the exterior part of the instrument were three separate faces, or dials, described into a number of circles for the orbits of the planets and signs of the zodiac; the lowest face contained the circles of the Sun, Venus, and Mercury, which were denominated the inferior planets, and their respective hands or arms; the uppermost face had the circles of Saturn, Jupiter, and Mars, with their respective hands; and the face in the middle had twelve hours, and also a circle for the moon. The first wheel which gave motion to all the rest was carried round by a fall of water once in a minute, on the arbor of which was a single endless screw, which drove a wheel of 15 teeth round in as many minutes; on the arbor of this was another similar screw, actuating another wheel of 24 once round in six hours; again, on the arbor of the wheel of 24 was another screw, making a wheel of 20 teeth revolve in five days; and lastly, a screw on the arbor of the last mentioned wheel of 20 impelled a wheel of 73 once round in exactly 365 days, which represented the annual motion of the sun in his supposed orbit round the earth. The last screw also drove a wheel of 45 teeth round in 225 days, which, by the help of two equal pulleys, carried Venus round the sun in this period; and in like manner, it is said, motions were produced in the rest of the planets, but the numbers of the other wheels are not given by Berthoud, from whom this account is taken. Alexander, in his "Traité des Horloges," has anticipated, in some measure, the observations which we should have made in these words; "this machine," says he, "cannot be of great utility, nor will it represent the motions of the planets with sufficient justice; for

"1. The first wheel which moves all the rest, is carried round by a fall of water, which cannot have the requisite regularity.

"2. The movement is not regulated by a balance, pendulum, or fly.

"3. The

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“ 3. The motion of the sun completes the year in exactly 365 days, which makes an error of 25 days in a century.

4. The discs of the planets are made much too large in proportion to the sun.”

The last of these observations must necessarily constitute an objection in every instrument, where the ball for the sun is not made inconveniently bulky.

We are disposed to think, that the irregularities of motion were not represented by the wheelwork in this machine, which appears not to have had accurate movements, but were indicated by the manner in which the circles were divided, some of which were most likely excentric. The supposed apogee points (not aphelion points) of the orbits of the planets, are put down in the account for the year 1642, thus :

Saturn	26°	53'	of Sagittarius
Jupiter	7	26	of Libra
Mars	29	49	of Leo
Venus	2	12	of Cancer
Mercury	14	6	of Sagittarius
Sun	6	29	of Cancer.

If we add to these numbers the annual motions of the aphelion points, as at present ascertained, the above quoted places will be found to differ only in the *minutes*, except in the instances of Mercury and Venus, in the former of which there is an error of about 2<sup>o</sup><sub>3</sub>, and in the latter, if we reckon forwards, of more than seven signs.

The system which is represented by this mechanism is the same as was represented by the preceding one of Oronce Finée, which proves that the Copernican system had not generally prevailed in the middle of the seventeenth century.

It may not be improper to mention here, that Cardan, who wrote in the middle of the sixteenth century, mentions the names of William of Zealand, and Junellus Turrianus, who invented machines of this description about the same time.

*Automaton of C. Huygens.*—We come now to the first machine, in all probability, which represented the true solar or Copernican system, namely, the automaton planetarium of Christian Huygens; the description of this instrument was not, indeed, published till the year 1703, among the

author's other posthumous works; but Benjamin Martin says, that this was the *original* from which all the more recent instruments were afterwards made, and informs us, moreover, that during the residence of this very ingenious mechanic and able mathematician at Paris, from 1665 to 1681, “ he invented and perfected several useful instruments and machines” (Biograph. Phil. p. 340.): we must, therefore, fix the date of the automaton to be in this interval. The learned inventor says, that he had seen and read of many elaborate instruments contrived for exhibiting the celestial motions, but as they were all very imperfect, he employed his mathematical attainments and mechanical skill, for both which he was justly renowned, in constructing a more perfect machine than any which had been before made, inasmuch as it was to represent the excentricities and unequable motions of a system, which was likely to maintain its ground amidst the scrutiny of after ages.

In the “ *Descriptio Automati Planetarii*” we meet with an account of the numbers, and a drawing of the wheelwork of this machine, which we briefly shall describe, and attach the proper value to each movement, and then make such observations on them as may occur.

In this machine there is a large watch or clock movement, regulated by a balance and balance spring, which actuates all the planetary motions, and keeps them contemporary with the real motions in the heavens. The motions are thus effected; a pinion of 4, which revolves by means of the clockwork in 4 days, drives a wheel of 45, on the arbor of which is another pinion of 9, driving a second

wheel of 73 once round in a year;  $\frac{45}{4} \times \frac{73}{9}$  of 4 days

being equal to 365 exactly. The last mover of 73 has a long arbor lying horizontally, or nearly so, across the machine, on which arbor all the first moving or driving wheels are placed of the different planetary movements; the ratios, therefore, constituted by the wheelwork are so many fractions of 365 days, according to the subjoined plan, in which the value of each separate movement is given in days, hours, minutes, and seconds, respectively: *viz.*

				D.	H.	M.	S.	
Mercury's movement	-	-	$\frac{12}{121} \times \frac{17}{7}$	of 365 =	87	21	50	47.4
Venus' ditto	-	-	$\frac{32}{52}$	of do. =	224	14	46	9.2
Earth's ditto	-	-	$\frac{60}{60}$	of do. =	365	0	0	0
Mars' ditto	-	-	$\frac{158}{84}$	of do. =	686	13	8	34.2
Jupiter's ditto	-	-	$\frac{166}{14}$	of do. =	4327	20	34	17.1
Saturn's ditto	-	-	$\frac{206}{7}$	of do. =	10755	17	8	34.2
Moon's lunation ditto	-	-	$\frac{12}{137} \times \frac{12}{13}$	of do. =	29	12	16	34.49

Besides the above wheels and pinions, there is a single screw driving a wheel of 300 teeth once round in 300 years of 365 days each, to shew for what year the instrument is at any time rectified: also the wheel of 73 drives a large wheel of 219 teeth round in three years, on which the days and months are marked.

Upon comparing these periods with the exact periods which the best tables give, the reader will observe many very considerable errors, and be disposed to conclude unfavourably of the calculations here employed; but what will be his surprize when he is told that Huygens wrote expressly upon an excellent method of approximating to the

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the truth, in calculations of this kind, which no doubt he employed before he began making his instrument! He will naturally conclude that the scientific contriver of this mechanism has not made the most of his calculations and ingenuity; and that this was really the case may be unquestionably proved; for the fact is, he has calculated periods in fractions of a solar year, and afterwards has introduced a first mover to revolve in a civil year of 365 days, as we have seen; whereas, he ought to have made the annual arbor revolve in 365.242 days, as his calculations supposed, and then the periods would have been these: viz.

		D. H. M. S.
Mercury	$\frac{12}{121} \times \frac{17}{7}$ of 365.242 =	87 23 14 47.9
Venus	$\frac{32}{52}$ of ditto =	224 18 20 48
Earth	$\frac{60}{60}$ of ditto =	365 5 48 48
Mars	$\frac{158}{84}$ of ditto =	687 0 4 38.8
Jupiter	$\frac{166}{14}$ of ditto =	4330 17 30 3
Saturn	$\frac{206}{7}$ of ditto =	10748 13 21 49.6
Moon	$\frac{12}{137} \times \frac{12}{13}$ of ditto =	29 12 44 46.35

These periods, being very near the true tropical periods,

must evidently have been calculated from a solar year, and therefore ought to have been produced by wheels placed on a common arbor revolving exactly in that time; hence, the substitution of a proper annual movement in this machine will restore to all the other wheels their proper intended motions, and make the periods what the wheelwork was calculated to effect. See NUMBERS, *Planetary*.

The last moving wheels, which are here put as numerators of the different respective fractions, were so many flat rings with the teeth cut in their posterior or concealed surfaces, and projecting more or less from their planes to meet their drivers; these were supported by intermediate fixed rings with friction rollers at both the inner and outer edges, and the driving wheels or pinions on the common horizontal arbor met their teeth, and impelled them round, whilst they were kept in their proper position by the rollers. On these moveable rings the planetary balls were supported, and the aphelion and perihelion points, latitudes, and shape of the orbits, were marked on the intermediate fixed rings, which, together with the revolving rings, resting on shoulders turned at the outward and inward edges of the fixed ones, formed the cover of the machine, and concealed the wheelwork from sight. The frame was two feet in diameter, and six inches deep, placed in an erect position; and the periods to be represented were collected from the tables of Ricciolus, according to which the solar year was 365<sup>d</sup> 5<sup>h</sup> 49<sup>m</sup> 15<sup>s</sup>, and a lunation 29<sup>d</sup> 12<sup>h</sup> 44<sup>m</sup> 3<sup>s</sup>, as we now generally reckon it. The aphelia, ascending nodes, inclinations of the orbits, mean distances, eccentricities, and proportional diameters, with respect to the sun, were taken from that ancient astronomer for January 1, 1682, as expressed in the annexed table:

	Aphelia.			Ascending Node.				Inclination.			Mean Dist.	Excentr.	Diam. comp. with the Sun.
	°	'	"	°	'	"	°	'	"				
♃	15	11	19	14	29	47	0	54	0	38806	8149	1 : 308	
♄	2	59	44	13	54	52	3	22	0	72400	500	1 : 84	
♅	7	7	20							100000	1800	1 : 110	
♆	0	30	17	17	38	12	1	50	30	152350	14115	1 : 166	
♁	7	55	43	5	30	42	1	19	20	519650	20558	2 : 11	
♁	27	39	46	21	36	26	2	32	0	951000	54207	Ring 11 : 37 Do. to ♁ 9 : 4	

It should seem from these dates that the instrument was finished in the year 1681, which was the year in which Huygens finally left Paris.

In the machine before us no diurnal motion of the earth, nor motion of the moon's nodes or apogee, was introduced, nor yet the motions of Jupiter's or Saturn's satellites, so that it was properly what is now called a planetarium, and differed from a common planetarium in what it professed to exhibit only, inasmuch as the variable distances and velocities of the planets were attempted to be exhibited: these two requisites are described as being produced in some of the planetary motions by unequal teeth cut in the last moving wheels, and in others by means of rings, cut into equal teeth, and placed excentrically as they regarded the sun: but it has been shewn, when we treated of the different methods that have been devised for producing unequal motion, under our article EQUATION *Mechanism*, that neither of these two methods, adopted by Huygens in his automaton, as he has described them, will produce more than *one half* of the grand equation, and it does not appear that he, in any instance, used them *jointly*; whence we may fairly conclude, that the accelerations and retard-

ations of velocity, being represented in only *half* their due quantity, were much less perfect than the author himself imagined.

Should our readers wish to attain a more clear conception of the internal structure and external appearance of the automaton of Huygens, he may consult the description of Antide Janvier, given in his quarto pamphlet entitled "Des Révolutions des Corps Célestes par le Mécanisme des rouages," (Paris 1812,) who, like ourselves, has given the substance of the original, together with two plates that illustrate the construction, but which did not fall into our hands till our description was finished. From a view of these plates it is evident, that both Mr. Walker's eidouranion, and Mr. Lloyd's celestial mechanism, are copied from the automaton on an enlarged scale, with but little deviation as to the mode of imparting and modifying the respective motions, though we have reason to believe that the periods produced in the latter machines are not so accurate as in the prototype.

Lastly, the objection which father Alexander made very properly to the preceding machine of Schirleus de Rheita, in regard to its losing 25 days in a century, is equally ap-

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plicable to the automaton, exclusively of its other defects; but this objection would be completely obviated by the substitution of an accurate annual movement, which has been just recommended to rectify the other movements.

*Romer's Satellite Instrument.*—The satellite instrument of Romer, or Roemer, presents itself next to our consideration, an account of which was presented by him to the first astronomer royal, Mr. Flamsteed, in the year 1679. Romer was mathematician to the French king (Louis XIV.) during the period that Huygens was resident at Paris, under royal patronage, and as this instrument was produced during the residence of Huygens, who had a great propensity for mechanics, as well as astronomy and mathematics, we think it extremely probable that Romer's taste for astronomical mechanism was owing to his acquaintance with Huygens; nor is it improbable that the plan and calculations of it might be submitted to the consideration of the Dutch resident.

This is the first machine in which we meet with a number of *tubes*, or what the French artists have called *canons*, introduced to move within one another for the purpose of connecting the arms of the planets, or secondaries, with their corresponding wheels, whilst the latter are concealed from sight: this original contrivance was, no doubt, meant to supersede the use of revolving rings and friction-wheels, which were heavy, as well as tedious to make; but then the idea of *variable distances* and *velocities* was given up with its introduction: since the author's time the common planetaria have been made upon this plan, but chiefly with the numbers ascertained by Huygens. (See PLANETARIUM.) The machine before us had a common arbor revolving in seven days, on which all the four driving wheels for the four satellites of Jupiter were fixed fast, which drove each its fellow, placed at the lower extremity of the corresponding tubes; the first satellite had the longest and innermost tube, the second the next, and so on as in the common planetarium.

The numbers of the wheelwork, and their corresponding values in time, may be expressed thus: *viz.*

Wheels.		D.	H.	M.	S.
Sat. 1.	$\frac{22}{87}$ of 7 days =	1	18	28	57.93
2.	$\frac{32}{63}$ of ditto =	3	13	20	0
3.	$\frac{43}{42}$ of ditto =	7	4	0	0
4.	$\frac{67}{28}$ of ditto =	16	18	0	0

There appears to be two reasons why seven days was the period assumed for a revolution of the common arbor; first, because a hand placed upon it would indicate the seven days of the week; and, secondly, because a period of seven days is nearly a mean period between the two extreme synodic revolutions of the 1st and 4th satellites, so that it is not necessary to use either a large wheel or a small pinion.

The four pairs of wheels were intended to be kept going by clockwork, but it does not appear that there was any movement proposed to require an annual index to point out the phenomena beyond the present or current moment, on which account the utility of the instrument was circumscribed.

The periodic errors in this instrument are as follow: *viz.*

In the movement of the 1st	= + 0' 21".93
----- 2d	= + 2 6
----- 3d	= + 0 4
----- 4th	= - 5 7

*Romer's Planetarium.*—But the satellite instrument of Romer was not the only instrument of which he superintended the construction: in the "*Basis Astronomiæ Roemerii*," Haunniæ, 1735, there is an account of a planetarium by this gentleman, constructed with tubes moving round one another, after the plan of his satellite instrument, and finished in the year 1697. The numbers of the wheels were, according to the size of the machine, as under; *viz.*

		D.	H.	M.	S.	
{	Mercury - $\frac{33}{137}$	-	87	23	28	19
	or ditto - $\frac{13}{54}$	-	88	2	44	30
	Venus - $\frac{24}{39}$	-	224	18	20	48
	Earth - $\frac{36}{36}$	-	365	5	48	48
{	Mars - $\frac{79}{42}$	-	687	0	4	38.3
	or ditto - $\frac{47}{25}$	-	686	15	44	20.6
	Jupiter - $\frac{83}{7}$	-	4330	17	30	3
{	Saturn - $\frac{206}{7}$	-	10748	13	21	49.6
	or ditto - $\frac{147}{5}$	-	10738	2	54	43

These were the effective wheels of the machine under our present notice; besides which, there were some others of high numbers, which might be considered as dial-work, a part of which effected the revolution of a hand or index in seven days for the week hand, and the rest produced a revolution in ten years, to indicate the year for which the instrument was at any time rectified.

The reason why the author has given the instrument-maker the choice of two pairs of wheels for Mercury, Mars, and Saturn, is, probably, that he might adopt those which best accord with the scale upon which his instrument is to be made. We have here calculated the tropical periods from the standard of an exact solar year; and on examining the numbers, the reader will find that Romer borrowed all his ratios, except those of Mercury, from Huygens; indeed all the modern planetaria of the shops have their numbers taken from the same source, except that, in some instances, 148 has been used for 147 in the wheels of Saturn, either by mistake, or because it was much more convenient to cut into teeth; but the difference occasioned by an omission of this one tooth in each revolution is 127 days' motion; and yet it does not appear that an error of such magnitude has been before detected!

For an account of the manner in which the wheelwork of this planetarium is constructed, and of the mode by which the motion of the planetary bodies are produced, our readers are desired to revert to the title *Common Planetarium*, in our article PLANETARIUM.

## PLANETARY MACHINES.

*Martinot's Armillary Sphere.*—In the "Traité des Horloges" of father Alexander (p. 323.), is contained a description of an instrument made by Martinot, a Frenchman, and presented to the king of France, on February 28th, 1701, an exact translation of which will constitute the most faithful account we can give. "The design of this piece of workmanship," says the author, "is the construction of an armillary sphere, which, by the motion of its circles, may imitate those of the heavens, particularly of the primum mobile of the sun and moon, and imitate, by a sensible resemblance, the apparent situation of heaven at every moment.

"The primum mobile makes its revolution in 24 hours from east to west upon the poles of the world, by means of a movement which is below the equinoctial polar dial-plate. The equator is divided into  $360^\circ$ ; and the zodiac, upon which are marked the signs, is pierced (in the middle we suppose), that its breadth may not conceal the sun and moon.

"The heaven is composed of three large circles, namely, the ecliptic and two meridians. The body of the sun is attached to a point of the common section of the meridian with the ecliptic. The ecliptic, turning upon its centre according to the order of the signs, carries the sun, and makes him perform a revolution through the ecliptic in 365 days; and at the same time the heaven is carried by the primum mobile from east to west in 24 hours. The heaven of the moon is also composed of three circles, like that of the sun; but the poles are five degrees removed from those of the ecliptic. The moon, turning upon the poles of her heaven, moves through the zodiac, according to the order of the signs, in the space of one lunar month, and in 24 hours from east to west upon the poles of the primum mobile. The body of the moon is of silver, of a spherical shape, one-half of which is darkened, and, presenting the illuminated half always to the sun, shews the phases. The moon's circles carry her from west to east in twenty-nine days and a half, to make a lunar revolution from one conjunction to another.

"In the middle of the sphere there is a little globe which represents the earth: this globe is immoveable, and Paris is constantly on its zenith. The meridian is divided two ways into degrees, which begin at the equator and end at the two poles, upon which the primum mobile turns. The equinoctial dial consists of two plates; that in the middle has the hours, and is immoveable; the other, which contains the names of the principal cities of the world, is carried by the primum mobile in 24 hours; and one may see at any instant what hour it is at each city which is marked. On the immoveable plate is seen the hour of the sun's rising and setting. The horizon carries two concentric circles, on which are marked the signs, and their corresponding days of the month. There are also the names of the winds and their divisions. Upon the stand of the sphere are put the allegorical figures which represent the four elements. The diameter is two feet."

Such is the account given by Alexander of Martinot's armillary sphere, to which he has annexed the following observation. "The motion of this sphere," says he, "is not very exact, because the sun's period is only 365 days, and wants almost six hours in a year. The motion of the moon, too, is performed in  $29\frac{1}{2}$  days; so that it wants 44 minutes in a lunation; and in less than three years this quantity amounts to more than a day."

Whether the motion of the sun in this sphere was considered as *real* or only *apparent*, does not appear certain from the account which is here given. In accommodation to natural appearances, we still, it is true, continue to speak

of the sun's place in the ecliptic; and the idea of the sun's performing an annual journey through the heavens is countenanced by the language of our poets; but in all cases it will be allowed, that an instrument ought to exhibit the system which it professes to illustrate, in a manner which cannot mislead the uninstructed. The inventor of the armillary sphere before us, we are disposed to believe, like Martin and Parke in our own time, affected to discredit the Copernican system.

*Pigeon's Sphere.*—Nearly about the same time with Martinot, M. Jean (or John) Pigeon constructed a sphere, in which the planets were introduced and kept in motion by clockwork: the account which M. Saverieu has given of this instrument in his "Dictionnaire des Mathematiques," makes it rank much higher in our estimation than the last we examined, and it is much to be regretted, that the numbers of the wheelwork have not been transmitted to us. The author expresses himself to this purpose: "Many ages have past over, before we have found ourselves in a situation to execute the plan of the sphere of Archimedes. It is not till our own days that a sphere in motion has been seen, for which we are indebted to the skill of our ingenious artist, M. Jean Pigeon. His sphere is eighteen inches in diameter, and elevated to the height of five feet four inches by a support, from the summit of which is suspended a pendulum: in the middle of the sphere stands the representative of the sun, which is a large gilt ball, and all the planets are attached to their orbits in respective order. Thus, Mercury is the nearest to the Sun, next moveth Venus, then the Earth, Mars, Jupiter, and Saturn. A pendulum gives motion to all the planets, and conducts them within the sphere, according to the order of the signs around the sun as their common centre. The earth turns upon its axis in 24 hours, and also makes the tour of the zodiac, according to the order of the signs, in  $365^d 5^h 49^m$ . Around the earth is a little circle which represents the ecliptic, so that one may judge in what sign any planet is, and whether its declination be north or south. This circle also serves to ascertain the retrogradations, direct motions, and stations of the planet. There are also two other small circles round the earth, one of which represents the horizon, and the other the meridian, which is adjustable to any place on the earth. To the orb of this planet is attached an index, pointing towards the sun, the use of which is to mark the times of the new and full moons; another index is placed below the moon to mark her latitude upon a plate, on which are marked the nodes, called the *head* and *tail* of the *dragon*, by means of which one may see if the moon be at any time in the ecliptic, &c."—From this description of Pigeon's sphere, it seems to have been the most comprehensive representation of the Copernican system of any which we have hitherto met with, inasmuch as the diurnal motion of the earth, and the motion of the moon's nodes, have been added to the revolutions of the planets. All the motions, we must conclude, were mean motions, and as nothing is said about the wheelwork, we know not how far these motions were accurate. The plan, however, seems to have been happily conceived, and well calculated to produce a pleasing object to the eye of a spectator.

*Orrery by Graham and Rowley.*—We have now come down to the time when our own country produced in a machine a combination of the annual and diurnal motions of the earth, together with the motions of the moon and primary planets, and gave to such combination the name of *Orrery*, in honour of the earl of Orrery, who at that time patronized the sciences; but as we have described this complex mechanism with considerable minuteness under our article ORRERY, it would be superfluous to say more

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in this place, than that the date alluded to was about the year 1715.

*A Sphere moving by Clockwork, calculated by M. Passémant, and constructed by Dauthiau, Clock-maker to the King of France.*—As this machine appears to be much superior to any of the preceding ones, both in accuracy and extent, it claims a detailed notice, which cannot be given more faithfully than by translating the abridged description given by Ferdinand Berthoud, from a small pamphlet of Dauthiau, published at Paris in 1756, in duodecimo.

“This clock, which is surmounted by a sphere, which it puts in motion according to the Copernican system, was presented to the Academy of Sciences on the 23d of August 1749, by M. Passémant, the author of the calculations of the sphere, to which he applied himself about 20 years. The gentlemen of the academy, from the report of Messrs. Camus and Deparcieux, the committee named for the examination of this clock, have certified that the revolutions of the planets are exact in it; for that they did not find a degree of difference from the astronomical tables in less than 3000 years. Dauthiau, the clock-maker, who constructed this machine, employed twelve years upon it. It was presented to the king at Choisy on the 7th of September 1750. His majesty, being a protector of the sciences and arts, testified his satisfaction of it, and ordered a new case to be made for it after a design of his own choice, which was executed by Messrs. Cassiry, father and son, after which it was again presented to the king at Choisy, the 20th of August 1753, and thence sent to Versailles.

“The sphere represents from day to day the different motions of the planets round the sun, *i. e.* of Saturn, Jupiter, Mars, the Earth, Moon, Venus, and Mercury, also their places in the zodiac, their configurations, stations, and apparent retrogradations with respect to the earth. Upon every circle which carries the orb of a planet, is engraven the time of its revolution round the sun. The earth, during its annual revolution, makes its movement of parallelism, and views the sun passing through the signs and degrees of the zodiac; also through the months and their day spaces, (quantièmes,) indicating the seasons, the equinoxes, and solstices; besides, it makes a rotation in 24 hours, being divided by 24 meridian lines: it has likewise a map of the principal places of the globe; so that the rising, setting, and meridian passage of the sun, together with his different elevations, and the continuance of day and night, may be seen for every principal place. The moon finishes her revolution round the earth in 29<sup>d</sup> 12<sup>h</sup> 44<sup>′</sup> 3<sup>″</sup>, during which time are indicated her age and different phases; her progress through the signs of the zodiac; her nodes, her eclipses, and those of the sun with precision, *viz.* their place, size, and duration; besides the various altitudes, and times of rising, setting, and southing.

“The clock beats seconds, which are indicated in the centre of the dial-face by a dead-beat escapement (*échappement à repos*) of a particular construction. This clock effects the equation by itself, by shewing both apparent and mean time (called by the French “*le temps vrai et le temps moyen*,” which, in England, mean the same thing); it strikes the hours and the quarters of solar time, which it will repeat at pleasure. The movement of the striking part is by a spring, fusee, and chain, that of the clock by a weight of twenty pounds doubly-suspended, which has a descent of eight inches in six weeks, and the going is not interrupted by winding up the weight. The pendulum rod consists of bars of steel and brass, adjusted so as to keep the metallic lens always at the same distance from the point of suspension by the difference of their expansions; and by this difference a hand is made to point out the variation of tem-

perature on a divided circle on the top of the rod, which forms therefore a natural thermometer by the sole action of metals.

“On the front of the clock, over the face, is a planisphere marking the age and phases of the moon; in which are, besides the day of the week, the names and days of the month, and year spaces after a new and singular method; for though some months have 28, 30, and 31 days each, yet the clock makes February to have 29 days every fourth year for bissextile. The mechanism for shewing the days of the year will point them out for ten thousand years, if the clock will wear so long, by means of four indexes revolving respectively in 10, 100, 1000, and 10,000 years.”

In this clock and sphere are three contrivances for disengagement; the first for the escapement; the second for the sphere to be detached from the clockwork to move by a handle; and the third for detaching the diurnal motion of the earth, that the planets may have a quick motion by means of a corresponding handle. Thus the different portions may be disengaged from each other to make the necessary rectifications. The number of wheels and pinions employed in this mechanism are 60, some of which are in the interior part of it; the diameter of the sphere is one foot, and is surrounded by a cover of glass; the case of the clock is d’or moulu, with four faces, having glass covers, neatly designed, well finished, and exposed so far to view, that all the mechanism may be seen: the whole height from the top of the sphere is seven feet.

According to the report of Antide Janvier, who was employed to repair this instrument, previously to its being placed in the gallery (of the first consul) at the palais des Thuilleries at Paris, in the year 8, the following are the numbers of the wheels and pinions which are put down in his own method of noting them, and also their respective values in time.

The periodic revolution of the Moon from a motion of 48 hours.

$$\left. \begin{array}{l} \text{Pinions } 72 \cdot 25 \cdot 20 \cdot 41 \cdot 20 \\ \text{Wheels } 75 \cdot 54 \cdot 44 \cdot 31 \cdot 73 \end{array} \right\} = 27^{\text{d}} 7^{\text{h}} 43' 4'' 58'''.$$

Revolution of Mercury from a motion of 27 days 7 hours, &c.

$$\left. \begin{array}{l} \text{Pinions } 31 \cdot 85 \\ \text{Wheels } 84 \cdot 101 \end{array} \right\} = 87^{\text{d}} 23^{\text{h}} 14' 15'' 56'''.$$

Annual revolution of the Earth from a motion of 87 days 23 hours, &c.

$$\left. \begin{array}{l} \text{Pinions } 8 \cdot 35 \cdot 83 \\ \text{Wheels } 43 \cdot 44 \cdot 51 \end{array} \right\} = 365^{\text{d}} 5^{\text{h}} 48' 58'' 3'''.$$

Revolution of Venus from a motion of 365 days 5 hours 48 minutes, &c.

$$\left. \begin{array}{l} \text{Pinions } 53 \cdot 76 \\ \text{Wheels } 42 \cdot 59 \end{array} \right\} = 224^{\text{d}} 16^{\text{h}} 40' 30''.$$

Revolution of Mars from a motion of 365 days 5 hours 48 minutes, &c.

$$\left. \begin{array}{l} \text{Pinions } 53 \cdot 75 \\ \text{Wheels } 84 \cdot 89 \end{array} \right\} = 1^{\text{y}} 321^{\text{d}} 16^{\text{h}} 32' 11''.$$

Revolution of Jupiter from a motion of 365 days 5 hours 48 minutes, &c.

$$\left. \begin{array}{l} \text{Pinions } 9 \cdot 45 \\ \text{Wheels } 49 \cdot 98 \end{array} \right\} = 11^{\text{y}} 312^{\text{d}} 22^{\text{h}} 28' 0''.$$

Revolution of Saturn from a motion of 365 days 5 hours 48 minutes, &c.

$$\left. \begin{array}{l} \text{Pinions } 7 \cdot 40 \\ \text{Wheels } 80 \cdot 103 \end{array} \right\} = 29^{\text{y}} 156^{\text{d}} 12^{\text{h}} 46' 40''.$$

Revolution of the Moon, with respect to the node, from a motion of 29 days 12 hours 44 minutes 3 seconds.

$$\left. \begin{array}{l} \text{Pinions } 50 \cdot 67 \\ \text{Wheels } 49 \cdot 63 \end{array} \right\} = 27^{\text{d}} 5^{\text{h}} 5' 36''.$$

N. B. Each dot between the figures in the above examples is a sign of multiplication.

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“It may be asked,” says Janvier, in a note to his report, „ where is the revolution of  $29^d 12^h 44' 3''$  which gives motion to this last movement, it being not contained in the preceding statement; but we have seen the periodic revolution, which consists of the time in which the moon goes round the heavens; that interval, we know, is shorter than a synodic revolution; but this (synodic) revolution has no real existence, but by means of the earth’s change of situation, whose orbit carries a wheel immoveably fixed at the centre of the moon’s orbit, round which the moon revolves really in  $29^d 12^h 44' 3''$ ; it is this wheel, then, which gives motion to the wheelwork which represent the eclipses with great accuracy. The last wheel of this movement carries a small dial-plate on which the moon shews her position with respect to the node; this dial carries besides an excentric piece, which makes the moon’s place above and below the plane of the ecliptic within the limits of her greatest latitude.

“The dial of the nodes is placed vertically, it accompanies the moon, and turns round the earth at the same time that it makes a revolution round its centre in the period we have specified. This peculiarity has rendered the calculation singularly complex, and the effect less convenient to observe. Notwithstanding this defect, this function is one of those which shews a greater genius than that of Passavant; it was necessary to be better acquainted with astronomy than

the rest of the parts demand, to devise a similar disposition of parts, which it is impossible to comprehend without figures.”

P. le Roi, speaking of this sphere, says “the calculations are so exact, that one could hardly imagine it possible to arrive at such accuracy.”

Such are the ample notices which we have procured of this instrument; but notwithstanding the accuracy of the mean motions above stated, it must be recollected that, as the equations of the centre and excentricity are not attempted to be represented, nor even the relative distances, the conjunctions, oppositions, stations, and retrogradations will be far from accurate in respect to the *times* of their appearance; besides, the want of the five last discovered planets renders it otherwise at this time incomplete.

In the account which has been here translated, it does not appear whether the *year* mentioned in the periods of Mars, Jupiter, and Saturn, is a solar or civil year of  $365\frac{1}{4}$  days, or whether it is taken at 365 exactly; we will therefore go through all the calculations again according to our own method, which, though attended with some trouble, (see NUMBERS, *Planetary*,) will afford us the satisfaction of knowing the precise value of each movement in days and parts of a day. The whole work abridged will stand thus: *viz.*

			D. H. M. S.
Moon’s period	$\frac{75}{72} \times \frac{54}{25} \times \frac{44}{20} \times \frac{31}{41} \times \frac{73}{20} = \frac{403266600}{29520000}$	of $2^d =$	27 7 43 4.96932
Mercury’s revolution	$\frac{84}{31} \times \frac{101}{85} = \frac{8484}{2635}$	of $27^d.3215853$	= 87 23 14 16.4976
Earth’s revolution	$\frac{43}{8} \times \frac{44}{35} \times \frac{51}{83} = \frac{96492}{23240}$	of $87^d.9682465$	= 365 5 48 59.04048
Venus’ ditto	$\frac{42}{53} \times \frac{59}{76} = \frac{2478}{4028}$	of $365^d.2423507$	= 224 16 40 28.408
Mars’ ditto	$\frac{84}{53} \times \frac{89}{75} = \frac{7476}{3975}$	of ditto	= 686 22 21 23.76
Jupiter’s ditto	$\frac{49}{9} \times \frac{98}{45} = \frac{4802}{405}$	of ditto	= 4330 14 26 43.64
Saturn’s ditto	$\frac{80}{7} \times \frac{103}{40} = \frac{8240}{280}$	of ditto	= 10748 4 52 59.20
Moon’s node	$\frac{49}{50} \times \frac{63}{67} = \frac{3087}{3350}$	of $29^d.53059$	= 27 5 5 32.67

From these calculations we find that the *solar* year is the year intended, as mentioned in the periods of Mars, Jupiter, and Saturn, which year is made by the wheelwork 11" longer than La Lande’s tables make it. The revolutions of the planets in his machine are tropical, and, though not so accurate as they might have been calculated in a shorter time than *twenty years*, yet are they more accurate than in any other machine which preceded it. The period of Saturn, which is the most inaccurate, is pretty nearly equally distant from that of Dr. Halley and that of La Lande.

*Passavant’s Planetary Clock.*—Besides the preceding machine of M. Passavant, this author invented a clock in the year 1754, which has a case of five feet in height, and which gives motion to a terrestrial globe of four inches in diameter, on which the different countries are engraven, and which is placed in the midst of artificial rocks and waterfalls that serve as an universal horizon: at some distance is represented the sky, containing a sun of three feet diameter, and all the primary planets in motion round him, according

to their respective velocities, and the four nearest according to their proportional distances; the excentricities and alternate increase and decrease of velocity at the perihelion and aphelion points are also effected, and all the phenomena depending upon the earth’s parallelism and diurnal rotation are accurately represented. There is also a moon performing a lunation, and all her various phases in the sky, in a natural manner. F. Berthoud has given his abridged notice of this clock from “Description et Usage des Telescopes,” a work published at Paris by Passavant in 12mo.; but as there is no account given of the numbers of the wheelwork, nor other particulars of the construction, we must suppose that the numbers of the preceding machine were adopted: the clock is said to have been made for the king of Golconda, and to be still in existence at Paris. It is matter of regret that we have it not in our power to describe by what contrivance the excentricity of each orbit is effected.

*Astronomical Machine by Phil. Mat. Hahn.*—If we pass over the days of Benjamin Martin and James Ferguson, whose

## PLANETARY MACHINES.

whose astronomical mechanism has in part been explained under our article ORRERY, and is to be found in their works in almost every one's hands, we meet with no original machinery of any importance till we arrive at the year 1791, in which a description was published in a pamphlet, in London, of a planetarium or astronomical machine, invented and partly executed by Phil. Mat. Hahn, member of the Academy of Sciences at Erfurt, and completed by Albert de Mylins.

This machine consisted of three several portions, which were actuated by a pendulum clock, and which composed three different systems; viz. 1st, the solar system of seven primary planets; 2dly, the particular planets only which have secondaries, in which those secondaries have their motions given by wheelwork as well as their primaries; and 3dly, a celestial sphere of copper, with 1500 stars engraved on it, in which were contained about 100 wheels that gave motion to the planets as they appeared when viewed from the earth. All these motions are said to have been produced by trains of wheelwork that were calculated with the greatest accuracy, but as the numbers have not been disclosed that compose the teeth of those wheels, we cannot form an estimate of their accuracy; neither can we gratify our readers with an account how the inequalities of motion were produced, according to which several of the planets are stated to have moved. The whole fabric was of the best workmanship, and its different portions were so symmetrically arranged, that it was deemed a handsome present to be taken by lord Macartney in his capacity of ambassador to China, where probably its uses will not be duly appreciated.

*Planisphere and Sphere by Antide Janvier of Paris.*—A. Janvier, whose new orrery we have described in its place, received his mechanical and mathematical instructions from l'Abbé Tournier, who maintained a system of astronomy in some respects similar to that of Ptolemy; and during the early part of his life the pupil employed himself in representing, by means of wheelwork, the planetary system of his matter, as seen from the earth as the centre of all the apparent motions. The terrestrial globe, placed in the middle of the system, was made to have the diurnal motion, while the sun was made a planet, with his secondaries, Mercury and Venus, beyond the orbit of the moon, which was considered as the first planet. The other planets had their

periodic revolutions in their respective times; but, to represent the retrogradations and stations, a second arm was made to revolve at the point of mean distance, in the same direction as the radius vector of each planet, once in each *synodic* revolution, as they regarded the sun, each short arm being made equal to the radius vector of the sun. This arrangement produced the geocentric appearances so well, that the author of the system pertinaciously withstood all the arguments of Cassini in favour of the Copernican system; and a perusal of it has probably laid the foundation of what has very recently been denominated the *Martian* system by a pretender, who is endeavouring, in our own time, to institute a *Society*, under *royal patronage*, for the defence of his system, as compared to that of Copernicus and sir Isaac Newton! Janvier, however, was soon convinced that the system of his preceptor was erroneous, and in the year 1789 he began the construction of a sphere that was to include the motions of the planets agreeably to the Newtonian system, and that was finished in the year 1801, after a period of eleven years spent in the calculations and construction. The sphere is mounted on a pillar with four faces, in the interior of which pillar are concealed a great variety of wheels and pinions, that are put in motion, like Hahn's machine, by a seconds' pendulum clock of the best construction. To these four faces are attached several dials and corresponding hands to indicate the various phenomena of the planets that are exhibited within the sphere, where the heavenly bodies are in motion. It would not be possible to give such a verbal description of this machine as would enable the reader to comprehend the peculiarities of its construction, without several plates for the representation of the respective parts; but we will not conclude our present article without giving an abridged account of its leading features. The trains of wheelwork contained within the pillar, and giving motion to the hands, have each six or eight wheels and pinions, from which consequently great accuracy may be expected; but those that actuate the planets within the sphere are not so numerous, and consequently not so accurate; so that the indication of the phenomena is more exact than the occurrence of those phenomena. The wheels and pinions that are principally employed, and the periods corresponding to the respective trains, may be put down thus:

### The Tropical Revolutions.

Mercury	-	$\frac{80}{10}$	$\times \frac{140}{43}$	$\times \frac{179}{53}$	of 24 hours	= 87 23 14 30
Venus	-	$\frac{62}{7}$	$\times \frac{81}{17}$	$\times \frac{197}{37}$	of ditto	= 224 16 41 25
Earth	-	$\frac{52}{7}$	$\times \frac{61}{13}$	$\times \frac{241}{23}$	of ditto	= 365 5 48 49 $\frac{1}{16}$
Mars	-	$\frac{89}{6}$	$\times \frac{137}{6}$	$\times \frac{144}{71}$	of ditto	= 686 22 18 35
Jupiter	-	$\frac{57}{6}$	$\times \frac{72}{6}$	$\times \frac{89}{6}$	$\times \frac{105}{41}$	of ditto = 4330 14 38 2
Saturn	-	$\frac{82}{4}$	$\times \frac{92}{6}$	$\times \frac{92}{8}$	$\times \frac{110}{37}$	of ditto = 10476 19 14 35
Georgian	-	$\frac{60}{6}$	$\times \frac{73}{6}$	$\times \frac{97}{6}$	$\times \frac{108}{7}$	of ditto = 30347 3 25 43
Moon	-	$\frac{23}{5}$	$\times \frac{37}{20}$	$\times \frac{61}{19}$	of ditto	= 27 7 43 4.4

# PLANETARY MACHINES.

## The Synodic Revolutions.

			D. H. M. S.
Mercury	-	$\frac{24}{6} \times \frac{27}{8} \times \frac{103}{12}$	of 24 hours = 115 21 5 37
Venus	-	$\frac{19}{4} \times \frac{53}{4} \times \frac{167}{18}$	of ditto = 583 22 5 0
Jupiter	-	$\frac{132}{6} \times \frac{158}{61}$	of 7 days = 398 19 12 54
Moon	-	$\frac{58}{15} \times \frac{65}{22} \times \frac{137}{53}$	of 24 hours = 29 12 44 2.87
Ditto	-	$\frac{19}{235}$	of 365.24222 = 29 12 43 31
1. Satellite of $\mu$		$\frac{4}{3} \times \frac{76}{31} \times \frac{98}{181}$	of 24 hours = 1 18 28 35.6
2. Ditto	-	$\frac{11}{6} \times \frac{13}{6} \times \frac{19}{17}$	of ditto = 3 13 17 54.7
3. Ditto	-	$\frac{63}{19} \times \frac{67}{31}$	of ditto = 7 3 59 35.55
4. Ditto	-	$\frac{61}{4} \times \frac{78}{71}$	of ditto = 16 18 5 4.2

## The Moon's Apogee.

From 24 <sup>h</sup>	-	$\frac{69}{6} \times \frac{127}{8} \times \frac{177}{10}$	= 3231 8 33 0
From 27 <sup>d</sup> 7 <sup>h</sup> 43 <sup>m</sup>		$\frac{57}{10} \times \frac{74}{13} \times \frac{113}{31}$	= 3231 8 44 0
From 365 5 48 49 <sup>s</sup>		$\frac{93}{98}$ , viz. $\frac{93}{98-93}$	= 19 $\frac{1}{2}$ years

## The Moon's Node.

From half synodic revolution of the Moon		$\frac{106}{25} \times \frac{259}{59}$	= 6798 5 0 0
From 365 <sup>d</sup> 5 <sup>h</sup> 48 <sup>m</sup> 49 <sup>s</sup>	-	$\frac{115}{102}$ , viz. $\frac{115}{115-102}$	= 8 $\frac{1}{2}$ years.

Besides these trains of wheelwork, there is one that converts mean solar into sidereal time, the numbers of which are these, viz.  $\frac{19}{29} \times \frac{67}{40} \times \frac{239}{63} = \frac{304247}{305085}$ , the difference between the numerator and denominator of which large fraction is 833; the acceleration of sidereal on solar time is, therefore,  $\frac{86400'' \times 833}{305085} = \frac{2160 \times 833}{7627} = 3' 55'' 54'''$  33<sup>'''</sup> 40<sup>''''</sup>; and the time required for its accumulation into 24<sup>h</sup> will be very nearly 365<sup>d</sup> 5<sup>h</sup> 48<sup>m</sup> 49<sup>s</sup>. There are various ingenious contrivances in the construction of this machine, that attest the mechanical skill of the inventor, but which cannot be intelligibly described without drawings: the principal of them are the manner in which the diurnal train is made to act; a representation of the two separate causes of the equation of time; and an union of the grand equation, of the evection, and of the heliocentric latitude of the moon, in every part of her orbit. In both the planisphere and the sphere there are some complex calculations introduced, in order that the periods, which would be altered by the mode in which the wheels are placed for action, may be rectified by corresponding alterations in the numbers of the wheels,

after the original calculations were made. But accurate as the trains in general are, we are of opinion that, in many cases, fewer wheels would have effected equal accuracy in the periods, particularly in that of Georgian, which is very erroneous; and as the four newly-discovered planets are left out, the machine cannot be called perfect at the present moment, notwithstanding the great pains that have been bestowed upon its construction for the continued space of eleven years. A memoir of this elaborate machine was laid before the National Institute of France, through the medium of Coulomb, Delambre, and Fred. Berthoud, which the last named has copied into his "Histoire du Temps," together with the various drawings, which the curious reader may consult with advantage, who wishes to make himself master of all the particulars of the construction.

In this historical sketch we might have introduced notices of other machines, such as the orrery of Ribright in the Poultry, of Dean in Dublin, and of Bolton, belonging to her majesty, at Windsor, if we had been aware that there is any thing peculiar in the construction of any of them; and with respect to the pendulous orrery of Rittenhouse in Philadelphia, and to that lately exhibited at the Pantheon, London, as well as to Mr. Walker's eidouranon, and Mr. Lloyd's diastrodoxon, we consider these not as objects of

close

close examination, but as conveying only general information by a scenic effect, not depending on the accuracy of the wheelwork, and therefore not claiming our minute attention. For an account of those modern machines, which appeared to us to merit a more particular description than we could allot them in this article, we must request the reader to consult our articles ORRERY, PLANETARIUM, and SATELLITE *Machine*.

**PLANETARY Dials**, those whereon the planetary hours, latitudes, or equations, are inscribed. See DIAL, ORRERY, and PLANETARIUM.

**PLANETARY Globe**. See GLOBE.

**PLANETARY System**, is the system or assemblage of the planets, primary and secondary, moving in their respective orbits round their common centre, the sun.

**PLANETARY Squares**, the squares of the seven numbers from 3 to 9, disposed magically.

Corn. Agrippa, in his famous book of magic, has given the construction of the seven planetary squares: M. Poignard, canon of Brussels, in his Treatise of Sublime Squares, gives new, easy, and general methods for making the seven planetary squares, and all others to infinity, by numbers, in all sorts of progressions. See MAGIC *Square*.

**PLANGESTA**, in *Geography*, a town of Bengal; 21 miles N.N.W. of Kishenagur.

**PLANIARY**, a town of Bohemia, in the circle of Kaurzim; 3 miles N.N.E. of Kaurzim.

**PLANIER**, a small island in the Mediterranean, near the coast of France. N. lat. 43° 12'. E. long. 6° 19'.

**PLANIFOLIOUS FLOWERS**. See FLOWER.

**PLANIMETRY**, **PLANIMETRIA**, that part of geometry which considers lines and plain figures; without any consideration of heights or depths.

Planimetry is particularly restrained to the mensuration of planes or surfaces; in opposition to *stereometry*, or the mensuration of solids. See MEASURING and SURVEYING.

Planimetry, or the art of measuring the surfaces and planes of things, is performed with the squares of long measures, as square feet, square inches, square yards, square perches, &c.: that is, by squares whose sides are an inch, a foot, a yard, a perch, &c.; so that the area or content of any surface is said to be found, when we know how many such square inches, feet, yards, &c. it contains.

**PLANING MACHINES**, are machines used to diminish the great manual labour of planing the surface of planks and boards of wood: in strictness, those alone should be termed planing machines, which operate to reduce the surface of the wood to a true and smooth plane, by means of planes or instruments of a similar nature, though actuated by the power of machinery instead of the strength of a man's arm; but custom has denominated those machines which cut flat surfaces in a different manner from planes by the same name.

These machines are of modern invention; the first, we believe, was projected by general Bentham, who obtained a patent for it in 1791. It consisted of a plane, to be put in motion by means of a crank turned by a mill, to give it a reciprocating motion; or on a smaller scale it might be worked by hand in the usual manner, but the plane was so formed as to require none of the skill and attention necessary in the ordinary method of operating: here the workman, besides exerting the force necessary to force the instrument along, has several points to attend to, even in the simple case of planing a straight board he must adjust his tool to the board in a proper manner for beginning the stroke, and employ sufficient force to keep it down to the board; and in returning, he must raise it up off the board sufficient to save the cutting edge from injury; he must also guide it side-

ways to prevent it slipping off the board, and if this is wider than the plane, he must constantly examine if he reduces the middle and the sides in a proper manner to make a plane surface; and, lastly, he must observe the marks he previously makes for the thickness of the board, that he may keep it parallel, and not reduce it too thin. By the general's invention all these circumstances are gained at once; the plane is made the full width of the boards intended to be planed, and on each side of it fillets or checks are fixed, which project beneath the face of the plane just as much as the thickness the board is to be reduced to: these checks, therefore, guide the plane sideways in passing along the board, and gauge it in thickness; because, when the board is reduced to the quantity which the checks are beneath the surface of the plane, the checks rest upon the bench or surface on which the board lies, and bear off the plane, so that it can cut no longer. The plane is kept down by its own weight, which is increased, when necessary, by loading it with weights, and these are contrived to be capable of shifting their position from one end of the plane to the other during the time it is making the stroke; because, at first the pressure is required at the fore end to enter the cut, but at the conclusion it must be greatest at the hinder end, to prevent the fore end tripping down the instant it leaves the board. By another contrivance the plane is caused to rise up sufficiently to clear the cutting edge from the wood when the plane is on its return. It is by a piece which acts as a handle to the plane, and to which the power is applied, that it is fixed in the manner of a lever upon an axis extending across the width of the plane, and carrying at each side thereof a short lever, provided with rollers in their extremities; the handle projects upwards from the plane, which being forced forwards by it, assumes an inclined position, as do also the short levers, and their rollers then rise above the checks of the plane; but when the plane is drawn back, its handle is first drawn back into an erect position, and the levers moving with it, their rollers project beneath the checks of the plane, and raise it off the bench, the plane being in its return borne by them.

The bench for supporting the board during the operation was also of a peculiar construction, in order to confine the work steady upon it. In cases when the boards to be planed are winding or irregular on the lower side, so that they cannot lie flat upon the bench, it is provided with two sides, which can be brought to close upon the edges of the board, and hold it steady between them, being furnished with one or more rows of flat teeth to penetrate the wood and retain it; these sides are contrived to rise or fall upon the bench, to accommodate the different thicknesses of the boards. When a very thin board is to be planed, it might be liable to spring up to the iron, so as to be reduced even after the plane came to rest with its checks upon the bench; to avoid this the edges of the board are to be held by the sides to the bench above-mentioned, but as it would still be liable to spring up in the middle part, heavy rollers, or rollers loaded with weights, are fitted in apertures made in the plane as near as possible to the cutting edge, and these will keep the board down close upon the bench. For planing pieces of greater thickness at one end than the other, the checks of the plane are to be borne upon rulers of wood laid on the bench on each side, the wood being as much thicker at one end as the board is intended to be thinner at that end; therefore, when the plane has reduced the wood, the checks come to bear upon these rulers, and cause it to move not parallel to the bench, but inclined, according as they are thicker at one end than the other: in like manner, by using them of different thicknesses at the different sides the boards may be made feather-edged.

Mr. Bramah invented a planing machine, which he has used

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used very advantageously for planing all kinds of timber flat, at an exceedingly small expence. In 1802 he took out a patent for the invention, which he describes in his specification to consist in the following particulars. "The cutting tools employed to reduce the wood, instead of being worked by hand are to be fixed on frames, some of which are moved in a rotatory direction round an upright shaft, and others have a shaft lying in a horizontal position like a common lathe. In other instances, the tools are fixed on frames, which slide in stationed grooves to be driven also by machinery. The principal points on which the merits of the invention rest are, 1. The materials to be wrought are made to slide in contact with the tool, instead of the tool being carried by the hand over the work in the usual way. 2. The tool is made to travel across the work in a square or oblique direction, except in cases where it may be necessary to fix the tool in an immoveable station, and cause the work to fall in contact with it by a motion. 3. Instead of common tools, bent knives, spoke shaves, or deep cutting gouges, are used for cutting off the roughest parts, and planes of various shapes and constructions, as the work may require, are applied to follow the former in succession, under the same operation, and which latter I call finishers. 4. These are fixed on frames which move in cases, like those on which the saws are fixed in a sawing-mill, and in other instances these frames are fixed on a rotatory upright shaft turning on a step, and carrying the frame round in a direction similar to the upper millstone for grinding corn, and sometimes the frames turn on a horizontal shaft, resembling the mandrel of a common turning lathe. The different planes, tools, &c. are fixed in the frames, so as to fall successively in contact with the wood or other materials to be cut, so that the cutter or tool calculated to take the rough and prominent part operates first, and those that follow must be so regulated as to reduce the material down to the line intended for the surface. These cutter frames must also have the property of being regulated by a screw, or otherwise, so as to approach nearer the work, or recede at pleasure, in order that a deeper or shallower cut may be taken at discretion, or that the machine may repeat its action, without raising or depressing the material on which they act. 5. When an upright shaft is used, the pivot is to turn in oil, and it may be raised or depressed at pleasure, by means of a greater or less quantity of the said fluid being confined between the end of the shaft and the bottom of the step. 6. The materials to be cut must be firmly fixed on a frame, similar to those in sawing-mills, on which the timber is carried to the saws. These frames must be moved in a steady progressive manner as the cutter frame turns round, either by the same power which moves the latter, or otherwise, as may be found to answer best in practice. 7. The motion of the cutter frames must be under the controul of a regulator, so that the velocity of the tool, in passing over the work, may be made quicker or slower as such work may respectively require, to cause the cutter to act properly to the best advantage." For this purpose Mr. Bramah proposes to use what he calls a universal regulator of velocity, and which he describes as follows: "I take any number of cog-wheels, of different diameter, with teeth that will exactly fit each other through the whole; suppose ten, or any other number, but for an example say ten, the smallest of which shall not exceed one inch in diameter, and the largest suppose ten inches in diameter, and all the rest to mount by regular gradation in their diameters from one to ten. I fix these ten wheels, fast and immoveable, on an axis perfectly true, so as to form a cone of wheels; I then take ten other wheels, exactly the

same in all respects as the former, and fix them on another axis, also perfectly true, and the wheels in perfect gradation also; but these latter wheels I do not fix fast on their axes, like the former, but leave them all loose, so as to turn upon the said axes, contrary to the former, which are all fixed. All these latter wheels I have the power of locking, by a pin or otherwise, so that I can at discretion lock or unite any single wheel at pleasure to the axis. I then place the two axes parallel to each other, with the wheels which form the two cones as above described, in reverse position, so that the large wheel at one end of the cone may lock its teeth into the smallest one in the cone opposite, and likewise *vice versa*. Then suppose the axis, on which the wheels are permanently fixed, to be turned about all the wheels on the other axis will be carried round with velocities correspondent to their diameters and those of the former, but their axes will not move. Then lock the largest wheel on the loose axis, and by turning about the fastened axis, as before, it must take ten revolutions, while the opposite wheel performs but one; then by unlocking the largest wheel, and locking the smallest one at the contrary end of the cone in its stead, and turning as before, the fastened axis will then turn the opposite ten times, while itself only revolves once. Thus the axes or shafts of these cones, or conical combinations of wheels, may turn each other reciprocally, as one to ten, and ten to one, which collectively produces a change in velocity, under an uniform action of the primun mobile, as ten to a hundred; for when the small wheel on the loose axis is locked, and the fast one makes ten revolutions, the former will make one hundred; and by adding to the number of those wheels and extending the cones, which may be done *ad infinitum*, velocities may be likewise infinitely varied by this simple contrivance: A may turn B with a speed equal to thousands or millions of times its own motion; and by changing a pin and locking a different wheel, as above described, B will turn A in the same proportion, and their power will be transferred to each, in proportion as their velocities reciprocally. Here is an universal regulator at once for both power and velocity. In some instances I produce a like effect, by the same necessary number of wheels made to correspond in conical order, but instead of being all constantly mounted on the axes or shafts, as above described, they will reciprocally be changed from one axis to the other, in single pairs, to match according to the speed or power wanted, just as in the former instance. This method will have, in all respects, the same effect, but not so convenient as when the wheels are all fixed."

The utility of Mr. Bramah's machine, not less than its ingenuity, has induced us to procure drawings of one of them, which he has in constant use in his factory at Pimlico. It is upon exactly the same construction as one he made for the royal arsenal at Woolwich, by which all the timber for gun-carriages, and other similar articles, is now planed at a trifling expence, compared with the old method of planing by hand labour. See *Plates I. and II. Planing Machine*, where *fig. 1.* is a plan of the whole machine, and *fig. 2.* an elevation thereof; A a is a vertical axis, put in motion by a steam-engine, the power being communicated to it by a pair of bevelled wheels B, one fixed on the vertical shaft, and the other at the extremity of a horizontal spindle C, *fig. 1.*; see also *fig. 8. Plate II.* which has a live and dead pulley upon it at c, for the reception of an endless strap, by which the machine is driven. The shaft a A is for the purpose of carrying an iron wheel 33, shewn separate in *fig. 3.*; it has the cutters fixed at the different points 7, 7, 7, 7, of its circumference; these

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these are six in number at each side, and are formed with cutting edges similar to gouges or scoops (see *fig. 7.*); at the two opposite points, 4 and 5, it has small planes fixed in its rim, as shewn separate in *figs. 4* and *5*: when this wheel revolves, its cutters will cut away all which projects above the plane of their motion; the wood is carried under them with a progressive motion, upon two moveable carriages E E and E E, one at each side of the wheel, and moving in opposite directions; they traverse upon iron beds, or railways F, F, which are more than double the length of the carriages: these are supported on iron legs, from a foundation of masonry, and well united together by cross pieces D, D, to keep them always in one plane, for upon this circumstance the truth of the planing depends. The pieces of wood to be planed are fixed down upon the carriages at G, G, and held firmly by screw-clamps with proper contrivances; the machine is then put in motion, and at the same time that the wheel is revolving the carriages are both drawn in opposite directions beneath its cutters, which soon clears away the wood to a perfect plane, by making successive strokes obliquely across the wood, and as the carriages advance these strokes proceed in succession from one end of the piece to the other. The gouges 7, 7, act first to chop, or hew away the wood roughly, but to a flat surface, and then the planes 4, 5, follow and reduce it to a smooth plane: this is accomplished by their being placed rather nearer the centre, so that they revolve in a rather smaller radius, and thus act upon the wood after the gouges have finished. We shall now enter more minutely into the details of the machinery: the two carriages E, E, are put in motion alternately, by means of an endless chain H H, which is extended between two horizontal wheels K, I; the centre pin of the latter is fixed in a piece of wood *d*, fitted in a groove formed between the two adjacent rails F, F, on which the carriages run; the slider has a screw *b*, by which it is forced outward, and thus strains the chain between the two wheels so tight, that when the wheel K is turned round, it will draw the chain, which being connected with the carriages beneath, gives them both a progressive motion. The wheel K is fixed upon a short vertical axis, upon the lower end of which is a pinion L, having its teeth engaged with a rack M, attached to the piston-rod of a cylinder 10, situated horizontally on the ground (see also *fig. 10. Plate II.*): the piston-rod, M, is fitted through a stuffing-box, *c*, at the end of the cylinder, and the piston, *f*, is fitted accurately to the chamber with leathers, to make it perfectly water-tight: the cylinder is bolted fast down upon the floor framing, as shewn in both figures, and pipes *g, b*, enter into it at each end, for the purpose of introducing or returning water, which acts upon the piston *f*, to give it an advancing or retrograde motion, upon the hydrostatic principle invented by Mr. Bramah, and described at the end of our article MACHINERY; see also PRESS, *Hydrostatic.* The steam-engine which gives power to the whole machine also works a small forcing pump, or injector, which is constantly pumping water into an air-vessel, under a great pressure: from this small copper pipes are conducted to the machine, to operate, when required, either in the cylinder 10, or in another, which is the stop, or support of the main vertical shaft, and gives the means of raising or lowering it with the wheels and cutters all together, to cause them to reduce the wood upon the bench to any required thickness. The admission of the water into these cylinders is regulated by cocks, situated at one side of the machine, in a position where a person can, at the same time, manage them, and have a complete view of all the machine, to watch its operation. The relative position of these cocks

is shewn in *fig. 8*, where that for the service of the cylinder is marked N, and the other for regulating the thickness is marked O, and *i* is the pipe leading from it to the bottom of the cylinder 13; the cocks themselves are shewn on a large scale in *figs. 11* and *12*: the entry pipe, which brings the water from the injector, is here plainly shewn, with two branches leading to the cocks. From the cock N, a passage directly opposite to the entry leads to the waste, or escape-pipe; and on the two opposite sides, at right angles to the former, are pipes *g* and *b*, leading to the front and back of the cylinder: the cock itself has two curved passages through it, which will make communication with any two adjacent pipes of the four; thus, as it stands in the figure, the water from the entry passes to the back of the cylinder, whilst the water contained in the front end is at liberty to escape at the waste pipe. In this situation the piston is moved towards the front end of the cylinder, and turning round the pinion and wheel K, (*figs. 1* and *2.*) moves both carriages in one direction: now by turning the cock N a quarter of a revolution in either direction, the same passages make a different communication, *viz.* from the entry to the front of the cylinder, and from the back to the waste; this throws the action upon the front side of the piston, drawing it to the back end of the cylinder, and moving the carriages in an opposite direction. By turning the cock only  $\frac{1}{4}$ th instead of  $\frac{1}{2}$ th, all the four passages are close stopped, and no motion takes place. The other cock, O, is more simple; thus, the entry is on one side, the pipe *i* at right angles to it, and the waste opposite the latter; the passage in the turning part of the cock is made diametrically through it, and another at right angles into it. In the position of the drawing, the pipe, *i*, is open to the waste, and permits the water in the cylinder 13 (*fig. 8.*) to escape; but when the cock is turned round one-fourth, to bring the short passage opposite the pipe *i*, a fresh supply of water will be admitted from the entry into the cylinder 13, or, by turning a little farther, all of them are shut. The cylinder marked 13 (*fig. 8.*) is fixed by screws in the middle of one of the cross bars D; it is accurately bored within, and fitted with a piston P, (see also *fig. 13.*) which is packed with leather cups, so that no leakage can take place by the side of it; in the upper side of the piston is a perforation for the reception of a steel pivot, which is fixed in the lower end of the great vertical spindle A, and thus supports its weight as it revolves; the upper end, *a*, of the great spindle is fitted through the centre of the cog-wheel, B, with a fillet, so that it has free liberty to rise and fall, but cannot turn round without the wheel; the wheel itself is supported by means of a cone formed on the lower part of it, and fitted into a socket supported at the top of four iron standards Q, Q, which are erected from the iron framing below, and thus they sustain the axis and wheel very firmly from the same frame as the rails F, F, which support the carriages. At the top of the vertical spindle a shackle, *a*, is fitted, by a pin with a head, inserted into the end of the axis, and retained by a cross pin; by this means the shackle is united to the spindle, to rise and fall with it, but not to revolve with it; a chain is attached to the shackle, and passes over a pulley, as shewn at *m*, in *fig. 2*, and thence to a small pulley *n*; to this is attached a larger wheel, *o*, from which a chain is carried, to suspend a heavy wooden ruler *p*, situated at some distance from the machine, and sliding in a groove; it has divisions shewing inches and parts graduated upon it, which are determined by an index fixed to the wood of the groove. On this scale, those divisions which are marked inches are three times that length, because the wheels *n* and *o* are as three to one in diameter:

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meter : this scale shews the thickness to which the machine will reduce the wood upon the carriages, the index being so adjusted that it stands at zero of the scale when the wheel 3 3 is lowered down till its cutter cuts the surface of the carriage ; then by turning the cock N, the water is very gradually admitted into the cylinder 13, and elevates the piston P, the shaft, and wheel altogether, to any required height above the bench, which is shewn in inches and parts by the scale to very great accuracy ; for by the cock being very partially opened, the wheel rises so slowly, that it can be adjusted to the greatest nicety. The wheels *n* and *o* are supported in the floor above the room, as is also the frame for the support of the axis, C, of the live and dead pulley *c* ; the endless strap of this pulley is guided through an eye at the end of an iron rod *s*, *fig.* 8, which is joined to a lever T, coming down in reach of the attendant, who also manages the cocks N, O.

The construction of the cutters is shewn in *fig.* 7 : here 3 is a section of a part of the rim of the wheel, and *t* an iron clamp screwed fast down upon it, as shewn in *fig.* 3 ; the clamp has a vertical mortise through it for the reception of the stem of the gouge cutter 7, which is fixed fast therein by a wedge piece and screw *v* : by this means they can all be adjusted till their edges come exactly into one plane, though not quite so deep as the faces of the planes : these are made, as shewn in *figs.* 4 and 5, in iron, being received into an opening in the rim of the wheel, and held fast by two bolts, *w, w*, with keys above the surface of the wheel to keep them fast ; the plane iron, *x*, is double, and fixed into its place by an iron wedge *y*, formed similar to that of a carpenter's plane.

It only now remains for us to explain the construction of the dogs or claws for holding the work fast down upon the benches E, E ; these are of two kinds, some fixed on the outsides of the carriage, and others in the middle, which draw up by screws to hold the wood fast ; the carriage is composed of two large beams E, E, *fig.* 9, which is a cross section of it ; these are united by proper cross pieces, and run upon the rails F, F, with metal pieces fixed on the lower sides of them. There are also several cast-iron frames fixed across, as shewn by the dark shaded parts *k* ; each consists of two cheeks, all formed from one piece, and leaving a groove between them ; in this groove a long screw, *l*, is fitted by a collar at one end, and operates upon a slider, 8, fitted into the groove ; a dog marked *z*, and bent something like an S, is attached to this slider, and projects above the bench, having a sharp point which penetrates the wood 2 G, and forces it against the other claws, *r, r*, fixed on the outsides. When the wood, as G, *fig.* 9, is of small size, another small claw, 9, is applied ; this is screwed into a nut of brass, which is fitted into the groove, then a second piece of wood, 2, is applied between it and the dog *z*, to transmit the force of the screw, *l*, to the other one at 9 : the outside claws, *r*, are formed on the top of square stems, which are fitted through clamps affixed to the sides of the carriages, as shewn in *fig.* 6, and provided with clamp screws, by which they can be fixed at any required height. The dogs *z* are very simply attached to the nut 8, by being applied upon the flat top surface of it, and one point enters into a small hole made in the fore part of the nut 8 ; by this means it is simply hooked into its place, and when the screw is turned, it cannot get loose ; another advantage is, that the clamp may be reversed, or turned the other way, and then the screw can be employed to hold the wood between *z*, and the claws, *r*, of the opposite side of the carriage. By these means the bench will hold a large piece of wood of the full width of the bench, or by introducing one of the clamps, 9, between each piece, it will hold as many narrow ones as will make

up the width, and they will be all planed together to one surface.

The endless chain H, which gives motion to the carriages, is connected with them by means of a piece of wood H, *fig.* 9, projecting down from it, and divided into two halves, between which the chain can be clamped or jammed fast when they are drawn together by a screw 6 ; therefore, by relieving this screw, the two halves open so much, as to permit the chain to slide freely between them ; in this case the carriage will stand still. This expedient is used when it is required to have one carriage disengaged, for, in general, both are used together, in the following manner ; suppose both carriages at the ends of their respective rails, the wood is laid upon them, and by the screw 6, which is turned with a winch, it is clamped fast on the chain. If the wood is winding, or irregular, it is made up at first by wedges, till its upper surface is parallel to the bench, and it is then fixed by the screws *l* ; the carriages are then engaged with the chain, by turning the handle of the screw 6, which for that purpose comes to the outside. Next the cock O is turned one way or the other, to raise or lower the cutter, till the gauge, *p*, shews it to be at the thickness the stuff is to be planed to. All being thus prepared, the handle of the lever, T, is drawn ; this draws the strap upon the live pulley *c*, and puts the machine in motion, and having acquired its full velocity, the same person turns the other cock N, and gently opens it ; this puts the carriages in motion, and he can, by regulating the handle of the cock, give it any velocity he wishes ; he can bring it up very quick, till the work comes under the cutters, and then move it very slowly, if much wood is to be reduced, or quicker when but little is to be taken off. In this manner the planing is performed from one end of the piece to the other, and the successive strokes of the cutters and planes follow each other so closely, as to leave an even surface, and with only such very slight scores across it, that the least shaving of a smoothing plane afterwards finishes it, from the roughest and most irregular timber which can be found.

In 1803, Mr. Bevans obtained a patent for a machine which we have seen at work for planing (or *sliding*, as the joiners term it) all kinds of mouldings or rebates, and ploughing grooves, as well as forming flat surfaces of small breadth, which it does with very little labour : in this machine, these operations are performed by the planes commonly used for similar purposes, with only such alterations as are necessary to adapt them to the machinery by which they are put in motion with mechanical power instead of human labour ; they are to be used either singly, or combined together in any number, according to the width of the boards to be worked at once, and the nature of the work to be done, so as to plane up at one operation such moulding as joiners work up by using several planes successively for the different parts ; this is effected by a kind of frame or box, which admits of fixing any number of planes in it, side by side, and at any distance asunder, to form the compound moulding required. The work is fixed fast on a bench, and the box of planes is made to pass over it, in the direction of its length, by a connecting rod communicating at one end with the box or frame containing the planes, and at the other end with machinery capable of affording a reciprocating motion.

This machinery consists of a crank, whose radius must be nearly half the length of the required stroke, and must be regulated accordingly : this regulation is effected by the arm of the crank passing through a mortise in a strong box, fixed on an axis, and sliding in the said box to any required length, where it must be fixed by strong screws, the axis being turned by manual exertion, by horses, steam, water, or any

other power, and having its motion regulated by a fly-wheel.

The planes are loaded, to keep them in contact with their work, by a long beam of wood, set up on end upon the sides of the box, and connected therewith by being divided into two cheeks, which at the lower sides are formed to an arc of a circle, and united to the box by chains, in the same manner as the beams of steam-engines are connected with their piston-rods. The upper part of the beam is made to pass always through one point by sliding between friction-wheels, or otherwise in a tube hung on two pivots perpendicularly over the centre of the work, and at such heights as may be most convenient for the length of the stroke required: the connecting-rod from the crank before mentioned is jointed to the upright beam, near its lower end, and by this means the motion is given to the box of planes, the chains and arches at the bottom allowing it in all positions to preserve the plane horizontal. To guide the box of planes in a rectilinear motion, and also to bear them off when they have been reduced to the depth required, fences are used, which are irons sliding perpendicularly in tubes or sockets in the box or frame, and clipping a tongue, or ruler fixed in the direction of the required stroke, in the frame supporting the bench.

PLANISPHERE, a projection of the sphere, and the several circles thereof, on a plane; as upon paper, or the like.

In this sense, maps of the heavens and the earth, in which are exhibited the meridians, and other circles of the sphere, are called planispheres. See PROJECTION.

PLANISPHERE is sometimes also considered as an astronomical instrument, used in observing the motions of the heavenly bodies; consisting of a projection of the celestial sphere upon a plane, representing the stars, constellations, &c. in their proper situations, distances, &c. Such is the astrolabe, which is a common name for all such projections.

In all planispheres, the eye is supposed to be a point viewing all the circles of the sphere, and referring them to a plane on which the sphere is as it were flattened. This plane is called the *plane of the projection*.

A perspective plane is only a plane of projection placed between the eye and the object, so as to contain all the points which the several rays drawn from the object to the eye impress thereon. But in planispheres or astrolabes, the plane of the projection is placed beyond the object, which is the sphere. The plane of the projection is always one of the circles of the sphere.

Among the infinite number of planispheres which the different planes of projection, and the different positions of the eye, would furnish, there are two or three that have been preferred to the rest. Such are that of Ptolemy, where the plane of projection is parallel to the equator; that of Gemma Frisius, where the plane of projection is the colure, or solstitial meridian, and the eye the pole of the meridian; that of John de Royas, a Spaniard, whose plane of projection is a meridian, and the eye placed in the axis of that meridian, at an infinite distance. This last is called the analemma.

The common defect of all these projections is, that they distort and alter the figure of the constellations, so that it is not easy to compare them with the heavens; and that the degrees in some places are so small, that they afford no room for operation.

All these faults M. de la Hire has provided against in a new projection, or planisphere; where it is proposed the eye shall be so placed, as that the divisions of the circles projected shall be sensibly equal in every part of the in-

strument. The plane of his projection is that of a meridian.

PLANISPHERE, *Nautical*. See NAUTICAL.

PLANITZ, in *Geography*, a town of Saxony, in the circle of Erzgebirg; three miles S. of Zwickau.

PLANK, a general name for all timber, excepting fir, which is from one inch and a half to four inches thick: if of less dimensions it is called *board*.

PLANK, *Garboard*. See GARBOARD.

PLANK-Hook, is a pole with an iron-hook at its end, with which the navigators shift their runs or wheeling-planks, as occasion requires.

PLANK-Piling, the same with *Camp-sheeting*; which see.

PLANK-Sheers, or *Plan-Sheers*, the pieces of plank wrought horizontally over the heads of the timbers of the fore-castle, quarter-deck, and round-house, for the purpose of covering the top of the side; hence sometimes called *covering-boards*.

PLANKENBERG, in *Geography*, a town of Austria; four miles S.S.W. of Talla.

PLANKENSTEIN, a town of the duchy of Stiria; four miles S. of Windisch Weifritz.

PLANKENWARD, a town of the duchy of Stiria; eight miles W. of Gratz.

PLANKING, in *Ship Building*, covering the timbers of a ship with plank; sometimes quaintly called *skinning*.

PLANO-Concave Glass, or *Lens*. See LENS.

PLANO-Convex Glass, or *Lens*. See LENS.

PLANSCHWITZ, in *Geography*, a town of Saxony, in the Vogtland; three miles W. of Oelfnitz.

PLANT, in *Botany, Gardening, &c.* See PLANTS.

PLANT, *Burning thorny*, a species of *Euphorbia*; which see.

PLANT, *Egg*, a species of *Solanum*; which see.

PLANT, *Ice*. See MESEMBRYANTHEMUM.

PLANT, *Parasitical*. See PARASITE.

PLANT, *Sensitive*, is the English name of a distinct genus of plants, called by botanists *Mimosa*; which see.

PLANT, *Bastard sensitive*. See ÆSCHYNOMENE.

PLANT, *To*, in *Military Language*, is to place or fix, as, *e. g.* to plant a standard. It likewise signifies to arrange different pieces of ordnance for the purpose of doing execution against the enemy or his works; as, *e. g.* to plant a battery.

PLANTA, in *Anatomy*, the lowest part, or sole of the foot of a man, comprehended between the tarsus and the toes.

PLANTAGENET, in *History*, an addition, or surname, borne by many of our ancient kings.

The term plantagenet has given infinite perplexity to the critics and antiquaries, who could never settle its origin and etymology.

It is allowed that it first belonged to the house of Anjou, and was brought to the throne of England by Henry II. where his male posterity preserved it till the time of Henry VII., a space of above four hundred years.

It is disputed, who it was that first bore the name. Most of our English authors conclude, that our Henry II. inherited it from his father Geoffrey V., earl of Anjou, son of Fulk V., king of Jerusalem, who died in 1144. This Geoffrey they will have the first of the name; and our Henry II. the issue of Geoffrey, by Maud, only daughter of Henry I. the second.

Yet Mahege will not allow Geoffrey to have borne the name; and adds, that, in effect, the old annalist of Anjou, J. Bourdigne, never calls him so. The first, Mahege adds, to whom he gives the appellation, is Geoffrey, third son of this Geoffrey V.

Yet must the name be much more ancient than either of these princes, if what Skinner says of its origin and etymology

logy be true. That author tells us, that the house of Anjou derived the name from a prince thereof, who, having killed his brother to enjoy his principality, took to repentance, and made a voyage to the Holy Land to expiate his crime; disciplining himself every night with a rod made of the plant genêt, genifla, broom; whence he became nicknamed *Planta-genêt*.

Now it is certain that our Geoffrey made the tour of Jerusalem; but then he did not kill his brother, nor did he go thither out of penance, but to assist king Amauris his brother. Who then should this prince of the house of Anjou be? Was it Fulk IV? It is true he dispossessed his elder brother Geoffrey, and put him in prison; but he did not kill him; nay, Bourdigne observes, he was even released from the same prison by his son Geoffrey V., already mentioned.

Farther; this Fulk did make a journey to Jerusalem; and that, too, partly out of a penitential view: we are assured, by Bourdigne, he did it out of apprehension of the judgments of God, and eternal damnation, for the great effusion of Christian blood in the many mortal battles he had been in. The annalist also adds, that he made a second voyage; but it was to return God thanks for his mercies, &c.; to which we may add, that Fulk was never called Plantagenet; so that what Skinner advances appears to be a fable.

There is another common opinion, which appears no better founded; and it is this: that the name Plantagenet was common to all the princes of the house of Anjou after Geoffrey V., whereas, in fact, the name was only given to a few, and that, as it should seem, to distinguish them from the rest. Thus Bourdigne never applies it to any but the third son of Geoffrey V. and distinguishes him, by this appellation, from the other princes of the same family. Though it is certain that it was likewise given to the elder brother, Henry of England, as before observed.

PLANTAGINELLA, in *Botany*, is Vaillant's name for the *Limofella*; see that article.

PLANTAGINES, the second order of Jussieu's seventh class, for the characters of which class see NYCTAGINES. The *Plantagines*, or *Plantagineæ*, as Jussieu now terms them, in which he is followed by Mr. Brown, Prodr. Nov. Holl. v. 1. 423, are thus defined.

*Calyx* mostly in four deep segments. *Tube* petal-like, contracted at the summit, and generally four-cleft, resembling a *corolla*, but withering and not deciduous, inferior. (This "tube" is the Linnæan *corolla*.) *Stamens* four; their filaments long, prominent, inserted into the bottom of the "tube." *Germen* solitary; *style* one; *stigma* simple. *Capsule* divided circularly, of one or two cells, with one or more seeds in each cell. *Perisperm* (or *albumen*) none. *Plants* herbaceous. *Sexes* sometimes in distinct individuals.

Jussieu's genera of this order are *Pfyllium*, *Plantago*, and *Littorella*. The two first are combined by Linnæus, as well as by Decandolle and Brown. The latter author describes an albumen of the shape of the seed, and of a densely fleshy texture. He remarks that the analogy between the supposed *corolla* of the *Plantagineæ* and the membranous tube, which connects the *stamens*, in the neighbouring order of *Amaranthaceæ*, or *Amaranthi*, is weakened by the presence of the same part in the female flower of *Littorella*, a monoecious genus. We would observe however, though by no means inclined to invalidate the opinion of the part in question being a real *corolla*, that barren filaments are often found in female flowers, and therefore any other organ relating to the *stamens*, may likewise be present in such,

while the *stamens* themselves are absent. See LITTORELLA and PLANTAGO.

PLANTAGO, the herb Plantain, seems most probably to have been so named in ancient times, either from its resemblance to the sole of the foot, *planta*, in flatness, breadth, and lines or furrows; or from the depressed trodden appearance of some of the most common species, particularly *P. media*. Such is nearly the explanation of Ambrosinus, Ray, and the lexicographers. Linnæus, in Phil. Bot. 167, has "*Plantago, planta tangenda*." "A bold etymology," says De Theis, who, nevertheless, leaves as he finds this derivation, without searching further. Linn. Gen. 57. Schreb. 77. Willd. Sp. Pl. v. 1. 641. Mart. Mill. Dict. v. 3. Sm. Fl. Brit. 182. Prodr. Fl. Græc. Sibth. v. 1. 99. Brown. Prodr. Nov. Holl. v. 1. 424. Pursh v. 1. 98. Ait. Hort. Kew. v. 1. 250. Juss. 90. Tourn. t. 48. Lamarck Illustr. t. 85. Gært. t. 51. (Coronopus; Tourn. t. 49. Pfyllium; Tourn. t. 49. Juss. 90.)—Class and order, *Tetrandria Monogynia*. Nat. Ord. *Plantagineæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in four deep erect segments, short, permanent. *Cor.* of one petal, membranous, permanent, withering; tube swelling in the middle; limb depressed, in four deep, ovate, acute segments. *Stam.* Filaments four, capillary, erect, extremely long, inserted into the tube, alternate with the segments of the limb; *Brown*; anthers rather oblong, mostly beaked or crested, incumbent. *Pist.* Germen superior, ovate; style thread-shaped, half the length of the stamens, stigma simple, acute. *Peric.* Capsule ovate, somewhat membranous, of two or four cells, bursting by a transverse circular fissure, the partition at length becoming unconnected. *Seeds* several, oblong, convex on one side, concave on the other.

Obs. In some species the calyx is equal, in others unequal. Mr. Brown remarks that *P. Coronopus* has four cells to the capsule, with one seed in each cell. Gærtner, without mentioning the number of cells, says there are four seeds in each cell, in that species. Tournefort made *Coronopus* a distinct genus, merely on account of the deep segments of the foliage. It is rather to be wished that *Pfyllium* of authors could have been retained, as there are several species of that supposed genus, and their branched leafy habit is very different from what is usual in *Plantago*. Jussieu thought to distinguish *Pfyllium* by having solitary seeds, but the same is the case with many indubitable species of *Plantago*, as *P. Bellardi*, *cretica*, *media*, and others. For the difficulties attending the true nature of the corolla, see PLANTAGINES.

Ess. Ch. Calyx four-cleft. Corolla four-cleft, inferior, membranous; its limb reflexed. Stamens very long. Capsule with two cells, bursting all round.

The fourteenth edition of Linn. Syst. Veg. enumerates twenty-four species of *Plantago*; Willdenow has thirty-three, to which one is to be added from the Prodr. Fl. Græc., four from Mr. Brown's Prodr. Nov. Holl., and five from Mr. Pursh's American Flora. The genus is divided into two very unequal sections, of each of which we shall give some examples, particularly mentioning the five British species. The new ones all belong to the first section.

SECT. 1. *Stem* none. *Flower-stalks* naked. Thirty-six species in all.

*P. major*. Greater Plantain. Linn. Sp. Pl. 163. Willd. n. 1. Curt. Lond. fasc. 2. t. 11. Engl. Bot. t. 1558. Fl. Dan. t. 461. Camer. Epit. 261. (*P. media*; Matth. Valgr. v. 1. 435. *P. latifolia*; Ger. Em. 419.)—Leaves ovate, smoothish, somewhat toothed, with longish footstalks. Stalk round. Flowers imbricated. Seeds numerous.

## PLANTAGO.

merous.—Common every where throughout Europe, as well as in North America, flowering at almost all seasons, in mild weather. *Root* perennial, of many long fibres. *Leaves* radical, several, upright or spreading, on channelled ribbed *footstalks*, ovate, broad, toothed or waved, nearly smooth, with seven or nine longitudinal ribs. *Stalks* several, erect, longer than the leaves, each bearing a dense cylindrical *spike*, of innumerable crowded, small, whitish *flowers*, with purple *anthers*. *Stigma* downy. *Capsule* elliptical, small, each cell containing several *seeds*, which are the food of small birds, and are often given to those kept in cages. This species is subject to many varieties, one of which we suspect to be *P. crassa*, Willd. n. 2.

*P. asiatica*, Linn. Sp. Pl. 163, has the appearance of *major*, but is more slender, with scattered *flowers* and angular *stalks*.—*P. maxima*, Willd. n. 3. Jacq. Ic. Rar. t. 26, is intermediate between the foregoing and the following.

*P. media*. Hoary Plantain. Linn. Sp. Pl. 163. Willd. n. 5. Curt. Lond. fasc. 4. t. 14. Engl. Bot. t. 1559. Fl. Dan. t. 581. Camer. Epit. 262. (*P. major*; Matth. Valgr. v. 1. 436. *P. incana*; Ger. Em. 419.)—Leaves ovate, downy, depressed, with very short *footstalks*. *Stalk* round. *Spike* cylindrical. *Seeds* solitary.—Common on open hills and pastures, where the soil is chalky or gravelly, flowering throughout summer. The broad depressed *leaves* are very conspicuous, and considered as a great blemish by those who are curious about their grass-plats. A single drop of oil of vitriol on the crown of each root is said to prove the best and most certain mode of destroying these intruders. The *spikes* are much thicker and shorter than those of *major*. The white *corolla*, pink *stamens*, and yellow *anthers*, make a far from inelegant appearance.

*P. lanceolata*. Ribwort Plantain. Linn. Sp. Pl. 164. Curt. Lond. fasc. 2. t. 10. Engl. Bot. t. 507. Mart. Rust. t. 67. (*P. longa*; Matth. Valgr. v. 1. 437. *P. quinquerivaria*; Ger. Em. 422.)—Leaves lanceolate, entire, acute at each end. *Spike* ovate. *Stalk* angular.—Extremely frequent throughout Europe, in pastures and waste ground, flowering in summer. The more elongated, erect, narrower, *green leaves*, with three or five ribs, and the short *spike*, the *calyx* of whose *flowers* is black, *corolla* brownish, and *anthers* white, mark the plant sufficiently. The entire *leaves* afford a less ambiguous specific distinction than the naked *spike*, by which Linneus meant to discriminate between this and *P. Lagopus*; for the *lanceolata* has a bracteated, though not a hairy *spike*, while *Lagopus* has a hairy one without *bracteas*.

*P. Lagopus*. Hare's foot Plantain. Linn. Sp. Pl. 165. Willd. n. 10. Ait. n. 10. Sm. Fl. Græc. Sibth. t. 144.—Leaves lanceolate, five-ribbed, distantly toothed. *Spike* ovate, hairy. *Stalk* round, clothed with upright hairs.—Native of the south of Europe, in dry open places; very common in Greece and the Archipelago.—*Root* perennial. Habit and size like the last, but the leaves are distinguished by their neat, prominent, more or less distant teeth. The *spikes* are shorter, rounder, hairy and pale. *Anthers* more obtuse.

*P. albicans*. Woolly Plantain. Linn. Sp. Pl. 165. Willd. n. 13. Ait. n. 12. Sm. Fl. Græc. Sibth. t. 145. (*Holosteum salamanticum*; Ger. Em. 423.)—Leaves lanceolate, oblique, waved, villous, *Spike* cylindrical, rather lax. *Stalk* round, longer than the leaves.—Native of Spain, the south of France, the Peloponnesus, and some of the Greek islands, but not common. It is perennial, flowering in summer. The divided leafy crown of the *root* sometimes

assumes the appearance of short stems. The *leaves* are long and narrow, spreading in an arched manner, not depressed; their surface glaucous, besprinkled with fine soft hairs. *Stalks* very hairy, especially when they first spring forth. *Spikes* long and slender, the *flowers* rather distant. *Bracteas* and *calyx* green, edged with white, hairy at the back. *Corolla* brown. *Stamens* red. *Anthers* yellow, with a small sharp beak. *Style* hairy.

*P. alpina*. Alpine Plantain. Linn. Sp. Pl. 165. Willd. n. 15. Ait. n. 14. Jacq. Hort. Vind. v. 2. 58. t. 125.—Leaves linear, flat. *Stalk* round, hairy. *Spike* oblong, erect.—Native of the Alps of Switzerland and Austria. Dr. Sibthorp found it about the summit of the Bithynian Olympus. The *root* is perennial. *Leaves* long and narrow, with taper points; the edges often fringed. *Stalks* hairy. *Spike* rather cylindrical than ovate. *Anthers* yellow, with a blunt beak. *Style* hairy. The Plantain noirâtre of Reynier, an alpine plant, with a short ovate dark *spike*, often mistaken for this, seems rather, as professor Schrader has hinted to us, a variety of *lanceolata*.

*P. Bellardi*. Bellardian Plantain. Allion. Pedem. v. 1. 82. t. 85. f. 3. Willd. n. 16. Ait. n. 15. Sm. Fl. Græc. Sibth. t. 146. (*Holosteum*, five *Leontopodium creticum alterum*; Ger. Em. 424.)—Leaves linear-lanceolate, hairy, flat. *Stalk* round, villous. *Spike* cylindrical. *Bracteas* pointed.—Found in Spain, Italy, Barbary, and on the summit of the Bithynian Olympus, as soon as it is clear of snow. The *root* is annual, erroneously marked perennial in Prodr. Fl. Græc. *Leaves* numerous, spreading, either quite entire, or toothed near the point. *Stalks* rigid, erect or ascending, two or three inches long, numerous, clothed with horizontal hairs. *Spike* thick, hairy, with prominent pointed *bracteas*. *Corolla* tawny, taper-pointed. *Anthers* yellow, with a pale two-lobed crest as large as their cells.

*P. cretica*. Cretan Plantain. Linn. Sp. Pl. 165. Willd. n. 17. Ait. n. 16. Sm. Fl. Græc. Sibth. t. 147. (*Holosteum*, five *Leontopodium creticum*; Ger. Em. 424.)—Leaves linear, flat, hairy. *Stalk* woolly, very short. Head of flowers roundish, drooping.—Native of Crete and Cyprus. A small annual species, remarkable for its numerous, short, deflexed, very hairy *stalks*. The *flowers* form a head, not a spike. The *corolla* is yellow, with a purple eye, its segments broader and shorter than in the last. *Anthers* similar to *P. Bellardi*, except that their crest appears to consist of one lobe only.

*P. maritima*. Sea Plantain. Linn. Sp. Pl. 165. Willd. n. 19. Ait. n. 17. Pursh n. 10. Sm. Fl. Græc. Sibth. t. 148. Engl. Bot. t. 175. (*Coronopus*; Ger. Em. 425. *C. sylvestris*; Matth. Valgr. v. 1. 449. *P. marina*; Ger. Em. 423.)—Leaves linear, channelled, nearly entire. *Spike* cylindrical, close. *Stalk* round, longer than the leaves.—Native of muddy sea-shores in Europe and North America, as well as of mountain rocks.—*Root* long, perennial. *Herb* extremely various in size and luxuriance. *Leaves* copious, spreading, linear, channelled, dark green, rather fleshy, occasionally hairy; their margins either quite entire, or sometimes beset with a few irregular teeth. On mountains they are generally narrowest and most entire. *Flower-stalks* few, ascending, about twice as long as the foliage, rather hairy. *Spike* slender, of numerous crowded or imbricated *flowers*. *Corolla* whitish. *Anthers* with a little sharp beak. *Style* downy. The structure of the *flowers* most agrees with *P. albicans*. The ripe fruit we have never examined. This species being, like the Thrift, *Statice Armeria*, found on the loftiest mountains, as well as on the sea-shore, its small alpine varieties have been taken for

*alpina*,

## PLANTAGO.

*alpina*, or confounded with *subulata*, neither of which are really known to be natives of Britain.

*P. subulata*. Awl-leaved Plantain. Linn. Sp. Pl. 166. Willd. n. 20. Ait. n. 18. (*Serpentina omnium minima*; Lob. Ic. 439. f. 2. *Coronopus five Serpentina minima*; Ger. Em. 426.)—Leaves awl-shaped, triangular, striated, rough-edged. Stalk round.—Native of the Swiss alps and the Bithynian Olympus, as well as of the coasts of the Mediterranean. Gerard might have it in his garden, but we have never seen a garden specimen of this species. Its root is perennial, running down in one great cylindrical body to the depth of a foot, or more, and divided at the crown into many short leafy tufts. The leaves are very copious, from one to three inches long, readily known by their narrow, linear, acute, triangular form, and rough edges. Flower-stalks rather stout, hairy, not numerous. Spikes cylindrical, not always perfectly close, various in length, and number of flowers, which seem to resemble those of *P. maritima*, but we have not been able to investigate their anthers. The bractæas are hairy, as long, or longer, than the calyx.

*P. gentianoides*. Gentian-leaved Plantain. Prodr. Fl. Græc. n. 355.—Very smooth. Leaves ovate, three-ribbed, somewhat waved. Stalk round. Bractæas ovate, naked, shorter than the calyx.—Gathered by Dr. Sibthorp on mount Olympus, with the preceding. Root perennial, thick. Leaves very like *Gentiana acaulis*. Stalks three or four inches high, quite smooth and naked. Spike cylindrical, slender, scarcely an inch long, perfectly smooth in every part. Bractæas, as well as the calyx, obtuse and pointless.

*P. varia*. Variable New-Holland Plantain. Brown n. 1.—Hairy. Leaves lanceolate, three-ribbed, toothed; woolly, as well as the stalks, at the bottom. Spike many-flowered.—Native of various parts of New Holland without the tropic. Brown. It was sent us from Port Jackson, in 1793, by Dr. White. The leaves are three or four inches long, from half an inch to an inch wide, most tapering towards the base, or foot-stalk, which last is variable in length; both sides are clothed with dense short pubescence, and marked with three, occasionally five, longitudinal ribs; margin often beset with distant, very large and dilated, almost ovate, teeth, sometimes with obsolete ones, or none at all. Flower-stalks taller than the leaves, at least when full-grown, hairy, round, woolly at the base. Spike cylindrical, hairy, of rather numerous, but sometimes distant, flowers. Bractæas ovate, concave, rather smaller than the calyx. Segments of the corolla rounded, or broad-ovate. Style nearly smooth. This species seems in many points akin to *albicans*, and to *Serraria* and its allies, but very distinct, as a species, from all of them.

*P. debilis*. Weak New-Holland Plantain. Br. n. 2.—Leaves lanceolate, toothed or entire, three-ribbed, flaccid; beardless, as well as the thread-shaped flower-stalk, at the base. Lower flowers of the spike scattered.—Found by Mr. Brown at Port Jackson, New South Wales. Nearly akin to the foregoing.

*P. bifida*. Hairy New-Holland Plantain. Br. n. 3.—“Hairy and hoary. Leaves linear-lanceolate, toothed; beardless, as well as the flower-stalk, at their base. Spike of many imbricated flowers.”—Native of the south coast of New Holland. Br.

*P. carnosa*. Fleshy New-Holland Plantain. Br. n. 4.—“Very smooth. Leaves lanceolate, deeply toothed, somewhat fleshy; naked, as well as the flower-stalk, at their base. Flowers from one to three.”—Native of the island of Van Diemen. Br.

*P. Serraria*. Saw-leaved Plantain. Linn. Sp. Pl. 166. Willd. n. 23. Ait. n. 20. (*P. apula laciniata bulbosa*; Column. Ecpfr. v. 1. 258. t. 259. *P. angustifolia ferrata hispanica*; Barrel. Ic. t. 749.)—Leaves lanceolate, five-ribbed, with awl-shaped tooth-like ferratures. Stalk round. Spike elongated, slender, cylindrical, imbricated. Bractæas taper-pointed.—Native of Italy, Barbary, Zante, and various parts of the Mediterranean and Archipelago. Root perennial, thick, so as to assume a bulbous aspect. Leaves numerous, acute, hairy, distinguished by their long, parallel, almost pectinate, teeth, in which they essentially differ from the broad rounded imbricated teeth of *P. macrorrhiza* of Vahl, Willd. n. 22. The spikes also are very much longer and more slender than those of that species, composed of innumerable crowded flowers, and longish taper-pointed bractæas.

*P. Coronopus*. Buck’s-horn Plantain. Linn. Sp. Pl. 166. Willd. n. 24. Ait. n. 21. Fl. Dan. t. 272. Engl. Bot. t. 892. (*Coronopus*; Matth. Valgr. v. 1. 448. *Cornu cervinum*; Ger. Em. 427.)—Leaves linear, in many pinnate segments. Stalk round. Anthers with a lanceolate crest. Capsule of four cells. Common in gravelly soils, and on sandy sea-shores, throughout Europe. It is annual, flowering with us all summer long, and conspicuous for its depressed pinnatifid leaves, spreading, close to the ground, in a star-like form, whence originated one of its names, Star of the Earth. Some of the starved maritime varieties have more fleshy, and nearly undivided, leaves. Spikes various in length, pale. Bractæas pointed. Anthers tipped with a lanceolate membrane, or crest, akin to what is seen in *P. cretica*, Willd. n. 17. Style long, very hairy.

*P. Cornuti*, Jacq. Misc. v. 2. 351. Ic. Rar. t. 27. Willd. n. 26. Ait. n. 23, appears to us but a luxuriant variety of the last; its stamens indeed are shorter, and style rather longer; but there is hardly a distinct specific character to be discerned. It is pity that Jacquin did not examine the cells of the capsule. He merely says “fructus congenerum,” which conveys nothing, in this case, that we want to know. If he had specified that the part in question agreed with all the rest of the genus, except *Coronopus*, it would have been decisive.

*P. Loeflingii*. Narrow Annual Plantain. Linn. Sp. Pl. 166. Willd. n. 25. Ait. n. 22. Jacq. Hort. Vind. v. 2. t. 126.—Leaves linear, with slender distant teeth. Stalk round. Spike ovate. Bractæas obtuse, with an orbicular membranous border.—Native of hills, and the borders of fields, in Spain and the south of France. No species is more distinct, or has been more mistaken, owing to Hudson and Linnæus having referred to this the toothed variety of *P. maritima*, figured in Petiver’s English Herbal, t. 4. f. 9, and Ger. Em. 423. The root of *P. Loeflingii* is small, tapering and annual. Plant extremely variable in luxuriance. Leaves upright or spreading, linear, acute, very narrow, beset with fine, distant, taper teeth. Stalks spreading, thread-shaped, hairy, usually shorter than the foliage. Spike of few flowers, ovate, or almost capitate. Bractæas orbicular, concave, pointless, formed of a broad membrane, with a thick green keel. The anthers seem to have a membranous tip, but we have not seen them fresh, and Jacquin’s figure has no dissected or magnified parts. He describes the capsule very accurately, of two cells, with one seed in each.

SECT. 2. *With a leafy stem*. Seven reputed species.

*P. amplexicaulis*, the first of these, Cavan. Ic. t. 125, appears a very doubtful species, perhaps allied to *albicans*, and certainly not more truly caulescent than some appearances of that plant. It is perhaps *P. angustifolia lanuginosa in-*

## PLANTAGO.

cana, Barrel. Ic. t. 750; a specimen of which, from the south of France, we have referred to *albicans*.

*P. Pfyllum*. Flea-bane Plantain. Linn. Sp. Pl. 167. Willd. n. 28. Ait. n. 25. Sm. Fl. Græc. Sibth. t. 149. Ehrh. Pl. Off. 271. — Stem branched, herbaceous. Leaves somewhat toothed, recurved. Heads leafless. Bractæas uniform, lanceolate, obtuse.—Native of cultivated fields, vineyards, &c. in the south of Europe, very common in Greece, being doubtless the real *ἄλλαν* of Dioscorides. The root is annual. Stem round, downy, glutinous, leafy; if slightly branched, erect; if much subdivided, decumbent. Leaves opposite, sessile, an inch or inch and half long, spreading, rather curved downward, linear-lanceolate, narrow, acute, flat, rough; tapering and entire at the base; sparingly but strongly toothed upwards. Flower-stalks axillary, solitary, round, rough, about the length of the leaves. Heads ovate, solitary, of several crowded flowers. Bractæas ovato-lanceolate, concave, blunt, rough at the keel, all uniform, and nearly of equal size. Calyx about as long as the bractæas, rough, obtuse. Corolla pale brownish-yellow, with pointed segments. Anthers with a short membranous point. Style hairy. Capsule obtuse, compressed, its circular fissure near the base. Seeds solitary in each cell. *P. Pfyllum*, Bulliard t. 363, in its large leafy bractæas and entire leaves, agrees best with *indica* of Linnæus.

*P. Cynops*. Shrubby Plantain. Linn. Sp. Pl. 167. Willd. n. 32. Ait. n. 29. (*Pfyllum majus supinum*; Baulh. Hist. v. 3. 513. Pl. sempervirens; Ger. Em. 587. Pl. alterum; Matth. Valgr. v. 2. 414.)—Stem branched, shrubby. Leaves entire, thread-shaped, straight. Bractæas orbicular, with linear points, much longer than the flowers.—Native of Provence, Italy, Switzerland and Bithynia. The stem is shrubby, and certainly perennial in our gardens, or rather greenhouses. Branches and heads purplish; the latter distinguished by their rounded membranous-edged bractæas, with linear rough points.

The cuts of old authors, given for the true *Pfyllum*, as Ger. Em. 587. f. 1. Matth. Valgr. v. 2. 413, and the modern plate of Bulliard, t. 363, having large bractæas under the heads of flowers, bear some resemblance to *P. Cynops*, but better agree with the *indica*, Linn. Sp. Pl. 167, and are possibly, like that, but varieties of *Pfyllum*. The *afra*, Linn. Sp. Pl. 168, appears to us much more clearly a luxuriant, biennial, and somewhat shrubby, variety of *Pfyllum*, with which it precisely agrees in every thing, but the more stout and shrubby habit of the stem.

*P. squarrosa*. Leafy-spiked Plantain. Willd. n. 29. Ait. n. 26. (*P. ægyptiaca*; Jacq. Ic. Rar. t. 28.)—Stem herbaceous, branched, diffuse. Leaves linear, entire. Heads oblong. Bractæas leafy, elongated, rough.—Native of Egypt. This is a very distinct annual species, whose long recurved bractæas are rough to the edge, scarcely at all membranous. The style is rough, much longer and thicker, and perhaps more perfect, in some flowers than in others.

*PLANTAGO Lancolata*, ribwort plantain or ribgrass, in Agriculture, has a perennial root, which, when old, appears as if bitten off at the end. The leaves are all from the root, truly lanceolate, distinguished by five (sometimes three or seven) prominent ribs, pointed, entire, or sometimes having a few teeth near the base. According to Withering, in maritime situations they are toothed all along the edges. They are of a dark green, mostly hairy beneath, taper at the base into a long flat footstalk, ribbed like the leaf itself, and at their insertion are invested with long white woolly hair springing from the crown of the root. The scapes or flowering-stalks upright, longer than the leaves, from

among which they spring; they are clothed at the base with the same kind of hair, and upwards are smoothish, round, with five deep furrows, slightly twisted, and terminated by a short ovate spike, imbricated with black scales, and enlivened with the prominent cream-coloured anthers, in its more advanced state. A spike will sometimes contain one hundred and thirty small flowers crowded close together, with an ovate pointed scale or bractea at the base of each. The capsule contains two oblong shining seeds, of an amber colour, in each cell. The stalks continue to grow after the flowering is over, and sometimes shoot out to the length of two feet more. When it grows in meadows, the leaves are erect and drawn up: but in a dry barren soil they are shorter, broader, and more spread on the ground. It grows spontaneously in dry pastures and other places, where it is often left untouched by cattle, to feed small birds with the copious produce of its seeds. It has often been considered as a weed, occupying the room of grasses, and other useful herbs; but has lately been introduced into culture as a good food for sheep, or to be made into hay for cattle in general. Haller has attributed the richness of the milk in the alpine dairies, in some measure, to this plant. And it has been remarked by Linnæus, that it has been eaten by horses, sheep, and goats, but that cows refuse it. Sheep, however, will eat it either green or dried, provided it be well gotten; but it does not answer for pasturage, without a mixture of clover or grasses, according to some cultivators. Withering suggests that the total absence of this plant, in marshy lands, is a certain criterion of their wretched quality. In proportion as such soils are improved by draining, it will flourish and abound. But others have suggested, that in this climate the produce of this plant is not a criterion of excellence in soil, but merely of its dryness. But though botanists do not speak favourably of this plant as a pasture or meadow herb, practical farmers hold it in a degree of esteem. And it has been asserted by Mr. Zappa of Milan, that it grows spontaneously in every meadow of Lombardy, especially in those which are irrigated; that it vegetates early, flowers at the beginning of May, ripens in five weeks, and is cut with the *poa trivialis*; that the height of the leaves is about one foot, and of the stalk a foot and a half; that it multiplies itself much by the seed and a little by the roots, which it continues for some time to reproduce; that it is eaten heartily by every sort of cattle, and in particular by the cows in grass, and the cows like it most in May, having great influence on the milk; that the hay is eaten more voraciously by cows, and has on them great influence in the flesh; in short, that it is one of the best plants either for the milk or the flesh. Where kept well fed down by stock, there can be no doubt of its being a good and nourishing plant for both cattle and sheep stock.

And Mr. Young states, that he had long before recommended this plant for laying land to grass, and sowed it on his own farm. At the same time he thinks it extravagant to propose dandelion and sorrel as plants proper for a cow pasture; and conjectures that those plants being found among good ones, have qualities given them which do not properly belong to them; he is likewise inclined to make the same conjecture in respect to narrow-leaved plantain, ribwort, or rib-grass, and should even have preferred dandelion and sorrel to it: but he is cautious of opposing theory to practice. But Dr. Anderson contends that narrow-leaved plantain or rib-grass is well liked by horses and cattle, and yields a very good crop upon rich ground tending to dampness, if it is at the same time soft and spongy; but that upon any soil which has a tendency to bind, or upon dry ground

ground, it furnishes a very scanty crop. And it has been made use of in some parts of Yorkshire as a summer grafs. As an article of pasturage for cattle and sheep, it is there in high esteem; it is not, however, well eaten by horses; and as an article of hay it is held to be detrimental to the crop; retaining its sap an unusual length of time; and when fully dry falls into a small compass, or is broken into fragments, and left behind in the field. One advantage of this plant is, that its seeds may be easily procured genuine. A small proportion of it may be eligible: it has now stood the test of twenty years established practice, and seems to be still in good estimation even among farmers that are the most attentive in grafs husbandry. It has been stated by Mr. Marshall that he made a trial of it in Norfolk, as a substitute for clover, but gained no credit from the experiment: on which it has been observed that the fact is, horses do not affect it, and they are the principal consumers of the clover crop in that county. It is a plant that varies much in size as well as in the breadth of the leaves, &c. The narrow leaves have only three ribs. The spike is sometimes surrounded by large leaves, instead of the usual small bractæas: it sometimes becomes an abortive panicle: and it is found with two or three heads. Its qualities seem to be nearly the same with those of the following; and it is more used than that by the common people in some places.

It is probable that the sort which has been termed grafs-leaved plantain (*tenuifolia*) by Dr. Anderson, is only a variety of this. See RIB GRASS.

PLANTAGO, *Major*, the great plantain. This affords more seeds than the former, and is perennial. The root when old is the thickness of the thumb, præmorse or stumped, laying strong hold of the earth by its fibres, which strike deeply, and are whitish. The leaves petioled, seven-ribbed, or sometimes nine-ribbed, smooth, but somewhat hairy when young, about a hand in length, often remotely toothed about the edge. The petioles long, convex on the under side, concave above, each forming a kind of sheath at its base. The scapes upright, pubescent, longer than the leaves. The spikes cylindrical, very long, linear, composed of many closely imbricate flowers, under each of which is a lanceolate concave bractæa. This is likewise a plant, according to Mr. Zappa, that may be useful as a cattle food. It grows not only along the roads, near dung-hills, in damp and fat places, but in irrigated meadows also of every district in Lombardy, though more near the borders than in the centre of them; it vegetates later than the above, flowering towards the end of May; the leaf is six inches long, and the stalk almost a foot high; notwithstanding it is not tender, every sort of cattle like it, and cows are as fond of it as of the above sort. It has also been noticed by Mr. Curtis that cattle in general appear very ready to eat the leaves. Sheep, goats, and swine, also eat it well. But it is not in so much esteem among the farmers as the narrow-leaved sort. See RIB GRASS.

PLANTAGO, in the *Materia Medica*. The leaves of the plantago major, common great plantain, or weybread, have a weak herbaceous smell, and an austere bitterish subsaline taste, and their qualities are said to be refrigerant, attenuating, subtyptic, and diuretic. Plantago was formerly reckoned among the most efficacious of vulnerary herbs; and by the peasants the leaves are now commonly applied to fresh wounds, and cutaneous sores. Inwardly they have been used in phthical complaints, spitting of blood, and in various fluxes, both alvine and hæmorrhagic. The seeds, however, seem to be better adapted to relieve

pulmonary diseases than the leaves, as they are extremely mucilaginous. The roots have also been recommended for the cure of certain intermittents. and from the experience of Bergius, not undefervedly. An ounce or two of the expressed juice, or the like quantity of a strong infusion of plantain, may be given for a dose; in agues the dose should be double this quantity, and taken at the commencement of the fit. Plantain has been alleged to be a cure for the bite of the rattle-snake; but for this there is probably little foundation, although it is one of the principal ingredients in the remedy of the Negro Cæsar, for the discovery of which he received a considerable reward from the assembly of South Carolina. Woodv. Med. Bot.

PLANTAIN, or PLANTANE, in *Botany*, &c. See PLANTAGO.

PLANTAIN, *Water*. See ALISMA.

PLANTAIN, *Lesser Water*. See LIMOSELLA.

PLANTAIN *Shot*. See CANNA.

PLANTAIN, *Star-headed Water*, *Damaſonium*, is a species of the *Alisma*; which see.

PLANTAIN-*Tree*. See MUSA.

PLANTAIN *Island*, in *Geography*, a small island in the Atlantic, near the coast of Africa N. lat. 7° 54'. W. long. 12° 18'.

PLANTANOCEPHALUS, in *Botany*. See CEPHALANTHUS.

PLANTARIS, in *Anatomy*, a small muscle situated in the calf of the leg. See GASTROCNEMIUS.

PLANTATION, in the *Islands and Continent of America*, a spot of ground which some planter, or person arrived in a new colony, cultivates and tills for his own use.

Plantations, or colonies in distant countries, are either such where the lands are claimed by right of occupancy only, by finding them desart and uncultivated, and peopling them from the mother country; or where, when already cultivated, they have been either gained by conquest, or ceded to us by treaties. See COLONY.

But there is a difference between these two species of colonies, with respect to the laws by which they are bound. For it hath been held (Salk. 411. 666.) that if the uninhabited country be discovered and planted by English subjects, all the English laws then in being, which are the birth-right of every subject, are immediately there in force. But this must be understood with very many and very great restrictions. Such colonists carry with them only so much of the English law as is applicable to their own situation, and the condition of an infant colony; such, for instance, as the general rules of inheritance, and of protection from personal injuries. But in conquered or ceded countries, that have already laws of their own, the king may indeed alter and change those laws; but, till he actually does change them, the ancient laws of the country remain, unless such as are against the law of God, as in the case of an infidel country. 7 Rep. 17. Calvin's case. Show. Parl. cap. 31. See CHARTER-Governments.

PLANTATIONS and *Trade*, *Board of*. See BOARD.

PLANTATION, in *Gardening*, a certain collection of different kinds of trees or shrubs, which are cultivated either in nursery grounds or other places, in order to be raised and protected to proper and suitable states of growth for being afterwards planted out in particular situations; or which are planted out for ornamental or other purposes, generally in the way of beautifying portions of ground or particular spots surrounding or lying about country residences, &c. The former are commonly denominated nursery plantations,

As most plantations of the latter sort, besides the ornament

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ment which they give, afford considerable improvement to the places where they are formed, they should, of course, be more fully attended to and regarded, in all cases and situations wherever there is any sort of want or deficiency of either variety or beauty. This is still further desirable, as they have also an excellent effect in all such situations, by giving an idea of grandeur to them, and at the same time an air of cultivation and fertility.

In the forming of these, as well as other kinds of plantations, it is constantly necessary to select and provide the plants with a view to the nature of the soils, and the peculiarity of the exposures in which they are to be placed.

The plants, for the most part, after being first raised from the seeds, or by some other proper means, and having a little growth, are transplanted or removed into nursery grounds or plantations, where they remain for two, three, or more years, according to their different natures, and the uses for which they are intended; when they are, in general, ready, and in the best order for being planted out in different sorts of plantations, as larger plants are commonly found not to succeed so well. Larger plants may, however, be occasionally found necessary, especially in particular cases of ornamental planting, and for producing blinds, covers, and shades, in some peculiar situations; but for all common purposes, in almost all cases of this sort of work, young plants, which have been raised in, and procured from, the nursery plantations, and which are from about two or three to five or six feet in their growth, are mostly in the best and most proper states to be employed, and especially in all situations where timber is in any way an object. The plants should also be chosen as nearly of equal growth as possible for the same plantation.

For all ordinary purposes of planting, a small portion of ground will be quite sufficient for raising the young plants; but in all nursery grounds of any extent, there are mostly pretty large tracts set apart for the purpose of receiving plantations of these kinds, where a great many different sorts of trees and shrubs of various growths are kept, being set out in rows at different distances, according to their ages and other circumstances. See NURSERY.

The young plants in all these nursery plantations should be kept clean and free from every sort of obstruction, by digging or hoeing frequently between the different rows, until they become of sufficient growth for being set out in other situations.

In regard to the preparation of the ground before the making of the plantations, in all those of the nursery kind it is constantly dug or trenched over with the spade; and this is likewise sometimes the case in forming those of the ornamental or other descriptions; though frequently the plants are put in without, simply by digging separate holes at suitable distances for the reception of each; or by forming slits or crevices for them by the point of the spade. The more fully, however, the land can be prepared previously to the plants being introduced, the better they will commonly succeed. Plantations are also occasionally raised by sowing the seeds of the different sorts of plants, either in small drills, or over the whole surface of the ground, after being made ready in the above manner, or without undergoing any such preparation, but in the latter case the plants seldom thrive so well.

In preparing the land for nursery plantations, a little manure is not unfrequently had recourse to in digging it over; but for those other kinds this is very rarely necessary.

In making all these sorts of plantations, the most proper times for performing the business is in mild dry periods, either in the autumnal, or very early spring seasons.

In the forming of every sort of plantation where any kind of ornament is intended, as great a variety as possible of different sorts of hardy trees and shrubs should constantly be had recourse to, such as those of the middling and more tall growths of both the kinds, which in the former or those of the tree sorts are usually the oak, elm, ash, beech, chestnut, hornbeam, birch, alder, maple, sycamore, plane, poplar, lime, walnut, wild cherry, mountain-ash, larch, willow, hazel, &c.; and in the latter, or shrubby sort, the pine, firs, cedar of Lebanon, holly, bay, laurel, yew, ever-green oak, box-tree, and some others. See DECIDUOUS, EVER-GREEN, and FOREST Trees.

In regard to the general disposition of the plants, the deciduous and ever-green kinds may be planted in separate compartments, or in mixture, and sometimes the tree kinds by themselves, some in running varying plantations, towards the boundaries of lawns, parks, paddocks, &c., others in avenues, groves, thickets, and clumps, variously disposed in different parts; and sometimes the trees and shrubs together, forming shrubberies, wildernesses, shady walks, and wood-works; placing those of taller growth backward, and the lower in front; bordering the whole with the most beautiful flowering shrubs and showy ever-greens, especially next the principal walks and lawns, varying the form of all the several compartments, sometimes by moderate sweeps and curves outward and inward, of different dimensions, other parts in long easy bends, varied projections and breaks, so as to diversify the scene in imitation of natural plantations. The proper distances, in planting, may be from five or ten to fifteen or twenty feet: for example, the tall trees designed for continued plantations may be from ten to fifteen or twenty feet, varying the distance in different parts, according to light and shade, &c.; and those in groves, where open, may be fifteen or twenty feet distance, and where close ten or twelve; for thickets, five or six feet, or closer in particular places where a very dark shade or thick coverture of wood is required; and in clumps of trees, from five or ten to twenty feet between the trees in each clump, varying the distance occasionally, according to growth, as also the sorts and numbers of trees in each, from two or three, to five, ten, or more. The form of the clumps may sometimes be triangular, at other times quadrangular, pentangular, &c., and some in curves, others in straight lines, to cause the greater variety. And in shrubby clumps, and wilderness compartments, where the trees and shrubs are employed promiscuously, they may be planted from five to ten feet distance; the taller growths being placed backward eight or ten feet asunder, placing the lower plants gradually forward according to their gradations, to the lowest in front, as above, at four or five feet distance: and if the trees and shrubs of the plantations in general are disposed somewhat in the quincunx way, they appear to the greater advantage, and produce a better effect in some instances.

Before the making of any of these sorts of plantations, the grounds should, in all cases, be well inclosed in some manner or other, and the plants be afterwards kept properly cleaned, pruned, and thinned out, so as to take their full growths.

Mr. Loudon, in his Treatise on Country Residences, after noticing the great variety which exists in trees, shrubs, and all sorts of wood, both in respect to beauty and utility, remarks, that all ornamental plantations may be divided into two kinds; namely, those whose grandeur is the effect to be produced, and those whose variety or beauty is the principal object. And it is asserted, that as grandeur depends more upon the whole than upon the parts, it may be produced where only one kind of tree is employed or made use of;

but

but that as variety depends upon the parts alone, many different kinds are necessary. This, it is contended, has given rise to a most erroneous opinion and very pernicious practice among landscape gardeners and planters. Imagining that variety is produced by mixture, their rule is to mix as many kinds together as they possibly can, and never to let two trees of the same species be seen at once. This is said to be their recipe for variety in plantations; which they follow, as far as possible, in every arrangement of vegetables, from the parterre to the forest. But instead of affording variety, it is maintained that it, on the contrary, produces the most distracting incongruity. The eye, in examining the parts, finds no connection—no harmony—no relief—no repose of effect—no difference of composition, or change of character; or, if the surface of such a plantation be looked upon from a distance, it is on account of the indiscriminate mixture of forms, more dull and monotonous than if only one species of tree had been used. Its outline against the sky is a mere unvaried zig-zag line; which, except in artificial plantations, is not to be found in the whole range of nature. It is further supposed, that this mixture is evidently produced by their ignorance of that which constitutes variety; for it does not, as they imagine, consist in the diversity of separate parts, but “in the diversity of their effects when combined together; in a difference of composition and character:” very different from the other is the effect of such a variety; it relieves the eye and interests the mind, without fatiguing either.

Therefore, in forming a plantation with a view to variety, instead of selecting such trees and shrubs as are of opposite character, those differing in the slightest degree are in general much better adapted to the purpose. The upright spiry form of the larch, mixes very ill with the round head of the oak. But by choosing trees of intermediate forms, and placing them in the interval between these extremes, a natural connection and gradation will be produced. By this means, with the store of trees and shrubs which we possess, an endless source of variety in woody scenery may be had from the forms of trees and their modes of growth, independently of any other material of landscape.

But there is another source of variety which arises from grouping, or the manner in which trees are disposed, more than from the number of distinct species. And this is chiefly applicable to extensive plantations where the general character is grandeur, as woods, groves, and forests. It is produced by mixing together tall and low growths; planting irregularly, sometimes very close, at other times very wide; by pruning so as to expose trunks, stems, or branches, in some places, and to conceal them in others, &c. Much of the effect also depends on the diversity of age in the low growths, as well as the difference of magnitude and accidental form of the trees. This kind of variety, it is supposed, exists in the greatest perfection in natural forests; and the true way to study its principles is, to observe in them the effects of time, accident, the browsing of cattle, the felling of timber, and other circumstances. By this means we shall, it is imagined, be enabled to transfer the same effects, sometimes by different and sometimes by similar methods, to artificial plantations. Natural forests cannot be too strongly recommended to the examination of the ornamental planter. Almost every other operation of planting is mechanical; it is in this mode of grouping, and following the principles of nature, that the man of taste will be distinguished from the mere gardener. The effect of putting in practice the principles to be derived from such a study may be seen, it is said, in Mr. Price's

woods at Foxley, which no man of taste ever, it is supposed, saw without being filled with wonder and delight.

A still further source of variety, which is independent of the modes of growth or the manner of disposition, is in the colour. Therefore, in order to assist in the arrangement of a numerous collection of trees and shrubs, a knowledge of the harmony of tints is essentially necessary to the planter, and of very considerable importance to his success in the business.

It may be thought, that the different tints of green in trees are distinctions too minute to be attended to for this purpose; but reflection and experience shew that they are of material consequence in this sort of scenery. Imagine, says the writer, two woods of equal and considerable extent,—the one composed of the yellow green of the weeping willow, the other of the dark green of the oak: how different must be the impression received from each, though the general form and composition of both, at a distance, would appear in some measure the same! It is evident, that the effect of the different greens must be much more conspicuous in scenes intended to be more minutely examined by the eye: how different even the green of the gooseberry-bush and currant-tree when opposed to each other!

It is remarked, that the tints of trees may be considered in respect to their harmony with one another—with external scenery—their gradation—and their particular effects. The harmony of tints is supposed, in general, to be derived from the respective agreement, disagreement, and destruction of particular kinds when mixed together; and that these harmonies, discords, and privations, will remain true, although the colours should not be bright. The slightest tinge will have the effect. When weak colours that agree are placed near each other, they support and give spirit to one another. A hawthorn hedge, among the green of pasture fields, has, it is asserted, the same dull green appearance; but when opposed to the brown of a ploughed field, it appears with peculiar spirit and force. And again, the ploughed field, were it not contrasted with the hedge or some object of a similar colour, would appear dark and colourless; but opposed to the hedge, it appears of a rich brown. A Huntingdon willow, observed alone, it is maintained, appears green like any other tree; but, contrasted with an oak or a chestnut, it approaches to white; and the oak again, by the contrast, appears much darker than before. If plantations were arranged agreeably to these principles, the colours would, it is believed, at all times appear striking and forcible; but from the opposite conduct, that of mixing all colours together, they are annihilated, and their separate effects destroyed. In consequence of this, it is frequently said that *trees have no colour but green, except in autumn*, and that attention to these principles in their arrangement is frivolous. But nothing can shew greater ignorance of nature. Green is indeed the predominant colour of trees; but it is only in one or two of the summer months that it nearly absorbs every other colour. All trees have their peculiar autumn and spring tints, which in midsummer are only weakened, not destroyed; and, whether it be not of greater importance to attend to the harmony of these tints, than to neglect it altogether, because the effect would be in some degree lost during a month or six weeks in summer, every man of taste or sense is left to judge. It is evident, that the *harmony of wood with landscape* must depend upon the general principles that have been already mentioned. One principle of harmony is, that the general appearance of the wood planted about a mansion should correspond with the general appearance of the wood in the surrounding country:

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if otherwise, the space so planted will appear a formal spot in the general view. The same principle requires also, that in a scene where water is a prominent part, and has a tendency to make the landscape too cold; trees of warm tints (by no means evergreens) should be principally planted adjoining to it. On the contrary, where buildings make the landscape too warm, cool tints, such as ever-greens, should be planted, to counteract that tendency. Some objects in landscape require to be relieved and set off with spirit, others require to be kept under, or prevented from becoming principal. These, and a great number of other important particulars, are effected by the colouring of trees and shrubs.

It is remarked, that if we operate with the permanent dark and light greens, as with light and shade in landscape painting, we may produce many of the effects of *aerial perspective*. The imaginary height of a hill may be increased, by placing dark coloured trees at the base, and lighter kinds towards the summit; so may the apparent breadth of a lake, by planting trees of a dark green on the side nearest the eye, and others of a lighter tinge on the opposite side; in the same manner, bays or recesses may be apparently deepened by placing the light coloured greens on the prominences. This mode of operating with the colours of trees will only be deemed unimportant, it is supposed, by the ignorant or unexperienced.

But though the harmony of tints only produces a pleasing scene, their disagreement, on the other hand, may produce a striking effect. An outline, which cannot be varied in form, may be broken by the opposition of its tints, or by masses of dark and light green. Two or three trees together, that form a striking contrast with all around, may attract the eye, and fix it so, as either to induce it to admire some object, as a building; or prevent it from viewing something disagreeable, or less noble, in the scene. Trees of a reddish tint, or ever-greens, have the power of attracting the eye in an astonishing degree; and in many places, where the former have been planted at random among other trees, they distract the whole scenery in the autumnal months.

In regard to the arrangement of the materials of plantations, the great business is that of uniting beauty with utility in the most natural manner, which is best accomplished by the consideration of forests or woody wastes, which are the species of scenery that approach as near or nearer to nature than any other in this country; by this means may be discovered the indications of every valuable or useful practice in beneficial or picturesque planting. But in respect to arrangement where utility alone is the main object, it may be observed, that as every tree has a certain soil and situation, or those in which it will prosper better than in any other, that is, produce timber in the greatest quantity and best quality, and as this tree will in general pay better than more valuable kinds which would not thrive, or would grow too quick in such places; it follows, that in the formation of useful plantations, one great object should be, to accommodate the trees to these circumstances, as already seen. And, as the properties of soils and situations are various, these naturally lead to a corresponding variation of the sorts of trees also; and this *variation*, it is supposed, *at once produces ornament and utility*. Thus, in natural forests such an arrangement actually takes place. Hence, in one part, the oak is found as the principal tree; the hazel the principal undergrowth; and other particular plants, grasses, and mosses, chiefly to prevail. While a little farther on, a few beeches mingle with the oaks; still more onward the beech becomes the principal tree; the undergrowths changing in

the same way, the thorn, with other plants, grasses, and mosses being found. Ultimately the land becomes moist, when the birch gradually shews itself, and this moisture increasing as the birch retires, it is succeeded by the alder; each with their appropriate undergrowths, or ever-varying glades of pasture, as shewn by Gilpin in his "Forest Scenery," and "Walks in a Forest," &c. In this manner the arrangement proceeds throughout the whole forest; and if the soil were minutely examined, it would be found to vary correspondently with the trees. Where the oak abounds, it will generally be deep and good; dry where the beech succeeds best; and moist in different degrees where the birch and alder prevail.

Planters, it is supposed, have seldom a sufficient idea of the effects and advantages that might be produced, by having recourse to this mode of arranging vegetables in artificial scenery, whether the first expence of planting, the future beauty, or the ultimate utility of it be regarded. Only those who combine a knowledge of botany with painting, it is imagined, can conceive the variety and perpetual interest that may be thus created in a place even of the smallest extent, and with the least natural advantages. In the present mode, all improved places have a sameness in their general appearance; as they are composed of the same kind of mixture. The shrubbery, or a part of it, in one place, is precisely the same with another at a distance from it, and affords a pattern of all others; but were nature followed in this respect, the variety would be endless. Nothing, it is believed, could then be more interesting, than to walk or ride through a place thus laid out; to view the trees, shrubs, plants, and even the grasses and ferns; the infinite diversity of shapes, colouring, and composition of the trees and shrubs; and the ever-varying openings and intricate recesses between them; again, varied with groups and turfs of flowering plants and ferns, spreading among the grass, in every direction; and all this independently of every other object, such as buildings, rocks, water, animals, distant prospect, and even variety in the grounds. So that by this mode of planting, a situation naturally the most dull and insipid, may be made infinitely varied and interesting. And it is asserted, that this mode of arrangement is not more beautiful in shrubberies, flower-gardens, and green-houses, than it is profitable in extensive plantations.

In the disposition of the wood in plantations about country residences, the forms of the surfaces the most desirable to be planted in the grounds, are chiefly to be determined by the character which they are to assume. Where they are of an even or level surface, there can be nothing to interfere with this rule; but when the surface is varied with swells, hollows, and abruptnesses, the great art is, to combine the natural character of the place with the character to be created; and when these are understood by the designer, the best effect will be produced. However, independently of artificial characters, nature always points out rising grounds for plantations. Wood placed on knolls or swells, it is contended, heightens their effects, and gives spirit, force, and intricacy to a scene, otherwise tame and monotonous. On the contrary, wood placed in the hollows only, or in the hollows and eminences indiscriminately, destroys all the expression or natural features of the surface, and often produces deformities. Nothing is more noble than a steep hill clothed with wood; but, imagine this hill perfectly bare, while the surrounding country is wooded, and it becomes a deformity in the general view. To plant the hollows, and leave bare the eminences, is, in almost every situation, counteracting nature. Even in pleasure grounds or parks, a  
group

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group of shrubs, or a few trees, placed upon a rise, however gentle, set off the scene, as it were, at once; but, plant them only in the low places, and they will remain until full grown before they have much effect; and at that time, though the residence may have the appearance of wood at a distance; yet, when it is examined particularly, the features of the grounds are totally destroyed. There are many places in the country which have a sufficient quantity of old wood, which, if it had been planted with a proper regard to the natural variety of the grounds, would have made them as superior to their present state, as that is now to such as are totally destitute of trees. It is not, however, meant that no low situation should be planted, or that trees should be placed formally on the summit of every eminence; on the contrary, dills, dingles, and such romantic places should be shaded with wood; and not a group, nor a single tree should exist, but what appears connected with other trees, as well as with the grounds. Taking the country in a general point of view, the hills should be wooded; the rising grounds between the hills and vallies diversified with handsome residences, pasture lands, and some corn fields; and the lowest parts kept in a state of almost perpetual aration. These vallies in general, in order to promote a more free circulation of air, and favour the particular mode of farming to which they are suited, should be free from plantations, and sometimes even from hedges. Viewed from rising grounds in the autumnal season, they should present broad flat shades of rich yellows, interspersed with farm houses, and relieved by roads, canals, or rivers. An example in illustration of which is supposed to be met with in the valley called the Carle of Gowrie in Scotland.

In fact, it is contended, that there is nothing of so great importance as the situation of wood, whether the general appearance of the country and the improvement of its climate, or the beauty and value of individual properties, are had in contemplation. All other operations that can be effected about residences, are thought comparatively of little consequence. It is the wood, it is supposed, like the shades in a picture, that gives the effect; and as it is by the situation and relative connection of these shades, that an expressive or unmeaning picture is produced by the painter; so by the site and connection of plantations, a place is either deformed or beautified by the planter. Even small groups and detached trees are of the utmost consequence in this respect, when skilfully performed or put in their places, but where the contrary is the case the whole is spoiled. It is said to be lamentable to see the plantations that are daily making at a considerable expence, without any regard to this principle. In this level country it may, however, be thought of less consequence, than where the grounds are strikingly varied by nature, as in Wales and Scotland, where it is of the first importance. It is conceived, that in less than half a century, wood may completely change the appearance of the residences of gentlemen, and of the whole country; and those who understand the subject will allow, that there is some danger of the change producing a bad effect, as is illustrated by the example of some parts of Scotland.

In respect to the quantity and disposition of the wood which is to surround residences, it should either, it is said, be arranged in groups, so close together, as, at a small distance, to appear a connected mass; or one or more large irregular masses must be planted, to which all the groups and single trees should seem to belong. The former method, it is suggested, will have a good effect when the surface is unvaried; but can only be adopted with propriety, when the situation of the residence is elevated or on a de-

clivity, where moisture or stagnation of air will not prove pernicious. But the latter method may be had recourse to in every case. In *levels*, the principal masses or masses may be placed at some distance from the house; which may still be connected with it or them by intervening groups judiciously placed for the purpose. On *irregular surfaces* and *hilly situations* the same mode may be successfully adopted. The masses may generally be placed upon the hills, while the connecting chain, thickets, and straggling groups descend into the valley, and embrace the house. These groups should never be large, three or four trees together will generally be sufficient; their effect depends not upon the magnitude of the group, but upon their number and apparent connection. This object is attained by making the groups loose and open, and by scattering single trees among them; and again by grouping these single trees, and even many of the groups and thickets, with low growths, as hollies, thorns, honeysuckles, ivy, &c. to take away from the formality of solitary and naked stems rising from smooth turf. The common method of scattering single trees here and there, and always at some distance from one another, gives a formal *stemmy* appearance to a lawn or park, which is never seen in nature. An example of the valuable mode of forming plantations, which is here recommended, is given from Foxley.

In regard to the nature or kinds of plantations, they may be considered as the *grove*, which is a collection of trees without undergrowth; the *wood* or *forest*, which is a collection of trees with undergrowth; the *copse-wood*, which is undergrowth alone; the *group*, which is composed of two trees or more, or a tree and one or more shrubs planted together; and the *avenue*, which consists of single rows of trees set in different directions according to fancy or utility.

The first, or *grove*, is divided into two kinds, the former of which is commonly employed for ornament in parks and other similar places. These are mostly uninclosed; they admit the pasture to grow below them; and appear, in walking through them, as a large collection of single trees. The latter kind of which is composed of the pine or fir tribe. This sort is for the most part planted upon hills, moors, commons, or other places of the same nature; they are thicker than the former kind, and they effectually prevent the growth of pasture: they are principally inclosed. The character of the former is generally solemnity and beauty; that of the latter chiefly picturesqueness. Groves are originally planted equally thick with other plantations. As they grow, they are gradually thinned out, until the trees left standing are able to defend themselves from cattle. The fence is then removed or destroyed, the outline varied, and the spaces between the trees sown with grass-seeds. Fir groves are often allowed to remain, without thinning, until they are fifteen or twenty years old; and then they are considered as a full crop, and cut regularly over. See GROVE.

The second, or *wood*, is mostly well suited both for ornament and utility. It is primarily formed by planting timber trees at such distances as would form a grove, and filling up the interstices with the kinds intended for undergrowth. This, it is supposed, is the most generally applicable kind of plantation, and commonly the most profitable, particularly when in stripes and belts. There, the undergrowth thrives best; thickens the stripe below; completes the shelter; and by concealing the real breadth, gives a massiveness and grandeur to narrow plantations, which they can never have, if planted in the grove style. Oak undergrowth is generally the most proper, and, if its worth were fully known, many plantations might be made

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made of double their present value, have a much better effect, and afford better shelter. Most plantations, especially in the northern parts of the country, though they generally go under the title of woods, are, in reality, of the grove kind. None of the trees are found kept under the rest in a decided manner, cut over, and allowed to spring up again, while a certain number, from fifteen to thirty feet distance, are preserved until their timber be full grown; but the trees being once planted, are allowed to grow up together, only a few being thinned out where they are too much crowded, and even this is very little attended to. Those removed are either cut over, or grubbed out by the roots, as is found most convenient, without any regard to propriety. In consequence of this management, a few bushes of undergrowth are found in some places, and the rest of the ground, if not shaded too much by the crowded trees, is covered with pasture; and neither the pasture, nor the undergrowth, from being intermixed, can be turned to the advantage of the proprietor. There are other plantations where undergrowth exists among timber trees in a more general way, but of kinds which are of little or no use, except for fuel; and this is by no means a profitable article, especially in a cold district. But, on the other hand, there are woods in some places where both timber and undergrowth are cultivated; and it is from observing the great profits derived by the proprietors of these, that the advantages of raising oak undergrowth in woods is so strongly recommended. The very high price which is given for oak-bark is generally known; and the sum given for an acre of oaks, from twelve to twenty-five years old, valuable for the bark alone, is very considerable. Instances of these kinds are adduced from the woods of Dunkeld in Scotland, where there are lands of very little value for any other purpose, that contain oak woods, chiefly of the natural kind, the undergrowth of which is sold every twenty-five years, at the rate of from 35*l.* to 60*l.* the acre, clear of all expences; or from 25*s.* to 48*s.* the acre annually; independent of the value of the timber trees left, fifty of which commonly remain to each acre. And in more low and sheltered situations, it is contended, that double the advantage would be derived, in consequence of the more quick growth, as in such cases the undergrowth would become equal in size in the course of twelve or thirteen years, and therefore afford two cuttings instead of one in the same length of time; besides more uniform crops be produced, from the greater regularity in planting, which would be adopted. But lest oak undergrowth should be thought to be made more profitable than it really is, it is further remarked, that, in the most cold, hilly situations of Scotland and Wales, it will afford upwards of 2*l.*, and in more favourable situations above 3*l.*, the statute acre annually; and if properly attended to in its early growth, still more. The easy and cheap method of raising it by means of the acorn, is also a great recommendation of it, as well as that of its growing better and more expeditiously in this way. Where an undergrowth alone of oak is wanted, other sorts of timber trees may be planted with the acorns. These statements strongly display the superiority and advantages of woods over other kinds of plantations; but the recommendation of the formation of them, exclusive of groves or coppices, is not by any means intended, as, on the contrary, there are thin kinds of land, with bad understrata, where the fir formed into groves, is more profitable than any other kind of plantations; and there are steep and rocky banks, where no tree can be so advantageously cultivated as the common ash; and rich moist places, where no plantation will turn out so profitable as oaks. But, ge-

nerally speaking, it may be safely asserted, that woods are the kind of plantation that ought to be most commonly formed; and that though the kind of timber grown in these woods must vary according to the consumption of different places, yet that oak will be found the best and most profitable undergrowth of any. See WOOD.

In respect to the third sort, or copse-wood, it is alone seldom desirable in point of character, though, in many places, it is the most profitable kind of plantation. Its formation is very simple: when of a proper size it is cut down; after which, the stools spring up again; and this operation is had recourse to in a periodical manner. These kinds of woods are, however, in general, under a very wretched sort of management in many parts of this country. See COPPICE.

With regard to the fourth, or group, whether made in the ground, or in the hedges which divide the fields, it should be well and ornamentally formed.

And in the fifth, or avenue, whether the rows of the trees be leading to a residence or in other parts of grounds, they should be well suited to the nature of their situations and other circumstances. See AVENUE.

In all cases where plantations are to be made, it is of great consequence to fix upon the most proper kinds. In ascertaining this, the kinds of woods and species of trees met with in the surrounding country, the market, the present or probable expence of carriage by land or water, and a variety of other circumstances, are to be considered; and that kind fixed upon which will in the end turn out the most profitable. And the plantations being once made, the particular kinds should be held strictly in view in their management afterwards. A collection of oaks designed for a grove, if not gradually thinned out as they grow up, will never, it is supposed, succeed; but if the same collection were intended for a wood, thinning them out, in place of cutting over, would lessen the crop of undergrowth. There is no method of management that will make a collection of firs a wood; nor can a collection of hazels, or other low growths erroneously planted to rear a grove, ever be made to assume that character. The idea of forming and preserving a distinct character in plantations, it is thought, is never sufficiently attended to by planters in general,—a certain space is to be planted, and it is filled up with trees at random. It is supposed to be from this neglect alone, independent of all others, as those of previously preparing the soil to planting, cultivating, and keeping it in order afterwards, training and thinning, with other operations, that few plantations yield one-third of the profit which they might. It is, however, suggested, that, if the particular kind of plantation to be formed, were previously determined upon, the business might proceed with a degree of certainty unknown and unpractised at the present period, as well as other great advantages be derived from it.

In relation to the outlines or boundaries of plantations, they should, it is imagined, be determined by the character which they are to assume. The tree being a picturesque object, all wood is consequently so; and as the addition of wood to ground is always an addition of picturesque qualities, although frequently blended with grandeur or beauty, hence the propriety of irregular or picturesque outlines in all kinds of plantations. Where the character to be produced is that of grandeur, the bounding line, it is asserted, should consist of bold angular prominences, succeeded by deep incisions, forming large bays and promontories; and to give these still greater effect, and vary their outline against the sky, they should be adapted to the variations of the ground, the bays being in the hollows, and the promontories

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mentories on the eminences. In this mixture of curves and straight lines, the former should generally be obtuse and convex, and the latter of considerable length. All should appear "irregularly great." Such plantations as are made on hills ought always to assume the character of grandeur. Those introduced among cultivated fields, and bounded by straight lines, may also have a very grand effect, if due regard be had to vary their outline, by attending to the angular insertions of hedgerows, or belts of planting; though, in this case, it is impossible to avoid a degree of formality, which is always connected with cultivation, and which, being essential to it, cannot be considered as a deformity. But where a plantation is to be made of a size which does not assume the character of grandeur, the outline should be composed of such a mixture of straight and curved lines as will relieve each other, produce variety and intricacy, and correspond with the surface of the ground. Nothing can be more unnatural or insipid than a serpentine line, or one wholly composed of curves, as the boundary of a plantation: it is totally void of variety and intricacy, and destitute of force and spirit, which are some of the great objects gained by planting, and which it is the peculiar property of irregular or picturesque forms to confer. The outline, whose ornament is a principal consideration, should be broken by single trees and groups, so dispersed, as to increase its irregularity, and take away from that formality and sameness which lines of every kind have, when viewed alone. Those who attempt this, without understanding effect, clog up the bays and recesses, in place of making them appear deeper and more intricate; and thus they do much more harm than good. The outline is also greatly varied, and much improved, by mixing low growths with timber trees along the boundary of the plantation; and afterwards by taking away the fence, and making partial inroads or recesses of different forms and degrees of depth. In open groves, where the trees stand single, and have no fence, the outline is easily varied, and with great effect. The different forms, colours, and shades of green, when no other mode is applicable, may often have a surprising effect in apparently varying the boundary of a plantation; a fine example of which is seen at Keddlestone. Groups and thickets, when planted in place of a circular fence, like a clump, should always have the most irregular outline. This irregularity is apparently increased, by mixing low with tall growths at planting; by removing the fence, when these are grown to a certain height; and by judicious thinning. The great beauty of small groups and single trees arises from their connection, and the bends and inclinations of their stems. This may be produced, by planting two or more trees or shrubs in one hole, of different kinds, or the same kinds of different sizes, &c.; and connecting these by others straggling round them. And the most beautiful examples for this sort of work are, it is supposed, to be found in natural forests, or woody banks and commons, where trees have sprung up in an accidental manner. Examples representing the manner in which small masses and groups of trees may be grown, without giving a clump-like appearance to the inclosures, are given from the working plans of planting at Barnbarrow, and other places. The general forms of the masses may, it is asserted, be infinitely varied on a level surface; and on an irregular one, they should correspond with it. And, as it is believed that this principle is universally applicable, there never can be the smallest necessity or apology for any thing of the clump kind in such cases.

PLANTATION, in *Rural Economy*, a portion of land planted with timber, or other trees. It is plain that planta-

tions, when judiciously made, not only afford great improvement to estates, but are highly ornamental to the country. They should, therefore, be more particularly attended to, where there are large tracts of poor barren lands, that cannot be converted to the more profitable purposes of tillage or grafs. They have also a fine effect in the vicinity of habitations. And in many cases, the proprietors of estates, whether of large or moderate sizes, may reap great pleasure and advantage in allotting a part of them to this use, as they give an air of cultivation and fertility; and after eight or ten years, in many cases, bring in great profit by the gradual thinning of the underwood, besides leaving a sufficiency of standards to attain full growth. The expence attending the making of plantations, and the knowing that they must wait several years before the trees have made any considerable progress, or can afford any advantage, often, however, prove an obstacle in attempting the prosecution of the business. But the expence of planting, where the plants are raised on the grounds, will not be so great as may be imagined, especially as a small spot of nursery-ground will raise plants sufficient, in three or four years, to plant a great many acres of land; and the expence of raising and planting, with the loss of time in waiting till the plants attain some growth, will be compensated by the first fall or thinning, in eight or ten years after planting; and the stools which remain shoot up again, in many of the deciduous kind, and afford a lopping every eight or ten years, exclusively of the due portion of standards, left at proper distances to attain full growth for timber, or other purposes.

It may be noticed that, in former ages, this island abounded in natural plantations or forests, which spread themselves over the surface of it to a very considerable extent, and which were composed of various sorts of tall or lofty trees of great magnitude, all blended together in a promiscuous manner, and of spontaneous growth. Those vast forests were never planted by any human hands; such only have been employed for ages in cutting them down: for in many places there were such profusions of useless wood, that large tracts were obliged to be cleared by degrees, in order to cultivate the ground for other purposes; which, together with the necessary demands for the wood, from time to time, for building, and other uses, as well as that of the owners of such lands reaping considerable advantage from the sale of their timber, continued gradually, one generation after another, the practice of grubbing up and destroying their timber woods and plantations without measure: and but few ever planted any in the place of that which they cut down; so that, in many parts, there is at this time almost a general demolition of woodland, and many considerable estates have scarcely any timber of consequence or value left standing upon them. There is, in short, a want, in most places, of nearly a complete renovation of the timber; which should take place as soon as possible, otherwise the nation, in many parts, may sustain considerable injury, from the increasing scarcity of so important an article of internal produce and general consumption. Every portion of land in the kingdom, which is capable and proper for the purpose, ought, therefore, without delay, to be covered with plantations of this sort. All the different steep, waste, unproductive tracts of land, in different situations, are in general fit for being converted to this use, often with considerable advantage, as from two or three to eight or ten times that which they could be made to afford under any other system of cultivation. It is indeed remarked, that of such barren wastes, there are few spots which would not admit of being improved in this manner, under particular circumstances;

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circumstances; and that there is a very great number of tracts, of vast extent, on which it would be far more profitable to the owner than that of attempting any other sort of improvement; as in all those cases where the soil is dry, but of an infertile nature, of a heathy, stiff, hard, clayey quality, with little surface produce, or where it is much covered or filled with rocks and stones; that, in fact, there is hardly any land so poor, barren, rocky, or unproductive, as not to admit of it, when properly managed.

In making plantations, it is necessary to choose such trees as are adapted to the nature of the particular soil and situation. As to the proper sorts of trees, most of the deciduous and evergreen kinds may be employed with propriety; and young plants of from about two or three to five or ten feet in height always prove more successful than such as are older, as those of a younger growth always take root sooner, and establish themselves more firmly, so as to form considerably the finest plantations at last, and are of longest duration: for though large trees of from fifteen to twenty feet in height, especially of the deciduous kind, may with care be transplanted, so as to grow, and probably thrive tolerably well for some years; yet, by not rooting firmly, like young plants, they often fail, and, after some years standing, have hardly any shoots, and at last gradually dwindle and perish altogether.

In cases where large plantations are to be formed of forest and timber trees, particular sorts must be chosen, consisting of deciduous and evergreen trees. Of the first kinds, the oak, elm, ash, beech, chestnut, hornbeam, birch, alder, maple, sycamore, plane, poplar, lime, walnut, mountain ash, larch, willow, &c.

There are two methods practised in forming plantations: one is by raising the trees from seed at once, on the ground where the plantation is intended to be, especially the deciduous kinds, and which is effected by sowing the seed in drills, a yard asunder, the plants remaining where raised, thinning them gradually; the other method is by previously raising the plants in a nursery, till two or three feet high, then planting them out into the places allotted them. The former, or that of raising the plants where they are to remain, though it may be more expeditious, and at once gets quit of the trouble of transplanting, requires greater attention for a few years, till the plants have shot up out of the way of weeds; but the trees, from their always remaining where raised, without being disturbed by removal, may probably make a greater progress. The latter method, or that of raising the trees first in the nursery, is probably the most commonly practised, as being thought the least troublesome and expensive, with regard to the attendance at first to the young growth. In respect to the preparation of the ground for the final reception of the seed or plants, it is mostly performed by deep ploughing and harrowing upon such ground as the plough can be employed on; but where this or other tillage is not practicable, only young plants from the nursery can be used, digging holes, &c. at proper distances, one for the reception of each plant. Where, however, the ground can be tilled, it will prove very advantageous, by performing it a year before; sowing it with a crop of turnips, or other plants of a similar kind; and when these come off, ploughing and harrowing the ground again, for the reception of either the seed or plants the ensuing season. The most proper season for making this sort of plantation, either by seed or plants, is any time in dry mild weather, in the autumn, as from October till February, or later in moist soils. Where large tracts are to be planted, both the seed and plant methods must be pursued all winter, at every favourable opportunity. The ground, where the

plantations are made, should be previously fenced in all round with a deep ditch, to guard against the encroachments of cattle, or other animals. In respect to after-management, while the plantations are young, they must have some attendance to destroy weeds, which may be expeditiously executed by hoeing between the rows in dry weather, or occasionally by horse-hoeing: and this care will be needful for two or three years, especially to the seedling plantations, until the trees are advanced out of the reach of weeds; after which no farther trouble will be required, until the trees are ready for the first fall or thinning for poles, faggots, &c.

After eight or ten years growth, they are mostly of a proper size to begin the first fall by a moderate thinning, which will serve for poles and faggot-wood, to repay some of the expence of planting, &c. But only a part of the plantation should be lopped the first year; thinning out the weakest and most unpromising growth first, leaving a sufficiency of the most vigorous plants pretty close, to grow up for larger purposes; the year following thinning another part, and so continue an annual thinning fall, till the whole plantation has been gone over; cutting each fall down near the ground, leaving the stools to shoot out again, especially in the deciduous kinds; and by the time the last fall has been made, the first will have shot up, and be ready to be cut again. So the returns of the fallings may be contrived to be every six, seven, eight, or ten years, or more, according to the uses the poles or wood are wanted for: and if large poles, &c. are wanted, the fall may be only once in fourteen, eighteen, or twenty years; still at every fall being careful to leave enough of the most thriving plants for standards; being left pretty close at first, that they may mutually draw each other up in height, but thinned out in every succeeding fall as they increase in bulk, and so as to leave a sufficient quantity of the principal trees at proper distances, to grow up to timber; which in their turn, as they become fit for the purposes intended, may also be felled, according as there may be a demand for them, to the most advantage; having young ones from the stools coming up in proper succession, as substitutes, so as the ground may always be occupied as completely as possible in all parts.

In regard to the advantages that may be derived from the use of different sorts of trees in plantations, they have been stated as very considerable by different writers. In Mr. Mellish's experience, on a forest sandy soil of 3s. an acre value, as stated by Mr. Young in his Eastern Tour, in 1771, and made in different ways; as by cleaning the land in the manner as for grain, ploughing once and then setting the trees, by trench-ploughing and setting, and by not ploughing at all, but setting in holes, with the ground only cleared for them: the results were found nearly equal; but what superiority there was, was in favour of the ploughing method. The sorts of trees were Scotch and Spruce firs, larch, oak, ash, chestnut, beech, birch, &c.; the whole being mixed. The Scotch and Spruce firs have grown much the fastest, and generally succeeded with scarcely any failures. The number set on the acre mostly 5000; the expence of inclosing, raising the trees, and planting, 3l. the acre. In five years they require thinning, when the wood taken out about pays for the labour; the number thinned out being about a thousand. And in five years more they are thinned again, when another thousand trees are taken out, which make good hedge wood and hedge stakes; the value about five pounds more than pays the expence of the labour. When these thinnings have been performed, three thousand are left, which have been found from experience

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to be then worth 6*d.* each on an average, as standards, and clear of all expences, if fold. At this time another thousand should be taken out. Two thousand are therefore left, which, at 30 years growth, will be worth, as they stand, 1*s.* each; and at 40 years, they will be worth 2*s.* each. This is the produce of such poor forest lands; but this experienced planter has, Mr. Young says, many Scotch firs planted 35 years ago in good land, which are worth 40*s.* each, and a great many from 25*s.* to 35*s.* On these *data*, Mr. Young calculates the profit of the plantations, at different periods, in this manner:

### Account of an acre of firs at the end of the fifth year.

	£	s.	d.
First inclosing, raising, planting, fencing, &c.	3	0	0
Interest of the above sum five years	0	15	0
Rent 15 <i>s.</i>	0	15	0
	4	10	0

### In five years more.

Reparation of the fences	0	5	0
Interest of 4 <i>l.</i> 10 <i>s.</i> for five years	1	2	6
Allow for compound interest	0	15	0
Rent	0	15	0
	2	17	6

First five

Expence at the end of ten years  
Received for thinnings

Excess

### At the end of twenty years.

Rent	1	10	0
Reparation of fences	0	10	0
Interest	1	0	0
	3	0	0

Received for 1000 at 6*d.*  
Value of 2000 remaining, at same rate

Deduct as above  
Excess at end of five years

Clear profit in 20 years

Which is *per acre per annum*

And that supposing the 2000 trees left ten years longer, the account will stand thus:

	£	s.	d.
Received for 1000 at 6 <i>d.</i>	25	0	0
Deduct, as above	5	7	6
	19	12	6

Profit in 20 years, exclusive of trees remaining

Which *per acre per annum*, may be called

### At the end of thirty years.

	£	s.	d.
Rent	1	10	0
Fences	0	10	0
Interest	1	0	0
	3	0	0

Supposing the plantation then cut down, the }  
2000 trees at 1*s.* bring - - - } 100 0 0  
Deduct, as above - - - - - } 3 0 0

Profit

First ten years expence  
Second ten ditto  
Third ditto

Total expence

Received second thinning  
Third ditto  
The 2000 remaining

Total  
Expences

Clear profit in 30 years

Or *per acre per annum*

### At the end of forty years.

Expences, as before

Received for 2000 trees at 2*s.*  
Ditto first and second thinnings

Total  
Deduct expences, as before  
Ditto

Clear profit in 40 years

Or *per acre per annum*

It is further stated, that this account of the expences, produce, and profit, of planting forest land at 3*s.* an acre, shews the amazing profit of such undertakings. Plantations have, in general, been raised with a view merely to beauty, or else through a very noble patriotic motive of being serviceable to the country; but it is evident, that they may be undertaken with very different views—with those of profit: so that a man may cut down the trees he planted himself, and expect to reap, in so doing, very considerable profit. If he cuts all down at the end of 20 years, and leaves not a single tree, he gains a profit clear of near 70*l.* an acre, which is 3*l.* 3*s.* *per acre per annum*, from the first planting. Let me ask the most skilful farmers of this country, how they will exceed such a profit, by any system of common husbandry, on such poor land? It before appeared, that common good husbandry, after some improvements, would yield but 1*l.* 1*s.* 11*d.* *per acre* profit; so that the planting to cut in 20 years, is more than thrice as beneficial, and certainly much less exposed to accidental losses. But supposing the trees left 30 years, in that case the thinnings pay,

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for the first 20 years, 1*l.* per acre per annum; and at the end of the 30th, the account from the first planting is 3*l.* 17*s.* 1*d.* per acre; and in 40 years, 5*l.* 6*s.* 1*d.* After which time, they may be supposed to decline in quickness of growth, and consequently had better be cut down, in point of profit. It is noticed, that if beauty of situation is not, in some respects, commanded, we seldom see plantations of quick-growing trees; but it is evident, that poor soils should be planted upon in the mere view of profit. A crop of firs, instead of a crop of wheat, barley, or oats, at 20 years growth, which so many men may expect to see arriving at perfection, turns out far superior. One of the most profitable farms would be a 30 years lease of such land, with liberty to plant and cut down. One of 20 years, which is a shorter period than the generality of long leases, would, thus applied, exceed common husbandry on such soils.

It is added, that Mr. Mellish has a waste, inclosed with a ring fence of 700 acres, which he would let at 3*s.* an acre, tythe free. Suppose a person hired it under a lease of 30 years;

The raising, planting, &c. &c. would come to	£ 2100
Rent for 700 acres, for 30 years	3150
Reparation of fences, suppose	30
Interest of 2100 <i>l.</i> for 30 years, at 4 per cent.	2520
Total expence	7800
Produce.—Thinning in 10 years, at 5 <i>l.</i> an acre	3500
Ditto, in 20 years, 1000 per acre, at 6 <i>d.</i> , 25 <i>l.</i>	17500
Cut down at 30 years, 2000 per acre, at 1 <i>s.</i> , or } 100 <i>l.</i> per acre	70000
Total produce	91000
Total expences	7800
Clear profit	83200

This account is stated in the style of a common farm; the first expenditure called stock, and compound interest, not calculated. It is very evident that no man, possessed of such soils, who can hire them for 20 or 30 years, under a planting lease, need ever be distressed at the idea of younger children's fortunes, or raising large sums of money in future. A moderate expenditure will, by planting, secure the certain possession of any sum that may in future be wanted.

And in Mr. Bevor's experiments, as stated by the same writer, Scotch firs, in 18 years, are found to be worth 2*s.* 6*d.* And a whole plantation of 50 years growth, worth 50*s.* on an average: they stand 20 feet square, which is 108 to an acre. In another plantation on a moist sandy loam, larches of 18 years growth, are worth 3*s.* 6*d.*: spruce firs among them not half so good, which Mr. Bevor attributes to their being trimmed up; others on same soil and growth, not served to, are almost double the size.

Mr. Berney, at Bracon Ash, has also made great improvements by planting land of 20*s.* an acre. Oaks, of 50 years growth, are worth 15*s.* each: they stand 15 feet square; this is 180 on an acre. Larch, in 18 years (20 from the seed), are worth 6*s.* each: they grow out of underwoods that pay 20*s.* an acre. Some few of 20 years, worth 15*s.* each. Silver firs in the same wood not quite so large, but they beat both the spruce and Scotch. They all stand 15 feet square in the underwood. And in another plantation without underwood, Scotch firs, of 18 years, are worth 2*s.* 6*d.*

each: they stand 8 feet square; which is 680 on an acre, or 85*l.*; that is, 4*l.* 14*s.* per acre per annum, exclusive of thinnings. No husbandry, Mr. Young contends, will equal this. A man who would plant for profit must not regret land of 20*s.* an acre.

The Weymouth pines, in 18 years, much larger than Scotch firs of 22 years.

But in Mr. Fellowes' of Shottesham experiments, who has, according to Mr. Young, tried various trees, some years ago, so that he is now able clearly to judge which is the most profitable; the following are the results.

*Experiment 1.*—A plantation of Scotch firs of 45 years growth, 20 feet square, on land of 15*s.* an acre, are now worth 20*s.* each on an average. At that distance there are 108 trees on an acre, or 108*l.*; which is 2*l.* 9*s.* per acre per annum, from the first planting, exclusive of thinnings, which would more than double it. But the grafts under the trees would have let for many years past at 7*s.* an acre.

*Experiment 2.*—Another plantation of Scotch firs, 38 years growth, standing in rows 14 feet wide and 10 in the rows, are now worth 12*s.* on an average. This distance gives 300 on an acre; and at 12*s.* they come to 180*l.*, or 4*l.* 14*s.* per acre per annum, besides thinnings. The rent of the land 15*s.*; poor rates, 1*s.* 3*d.* per annum in the pound; and tythe, till 20 years old, 5*s.* an acre; and the grafts under them now 5*s.* an acre. It is sufficiently evident, Mr. Young thinks, that no husbandry can equal this.

*Experiment 3.*—Chesnuts in 38 years, on the same land, standing 14 feet by 10, are worth 15*s.* each. This is 225*l.* per acre; or 5*l.* 16*s.* per acre per annum, besides thinnings.

*Experiment 4.*—Scotch firs in 38 years, on the same land, measure 17 feet of timber on an average, for which Mr. Fellowes has been offered 11*d.* a foot: that is, 15*s.* 7*d.* a tree. They stand 14 feet by 10. An acre would therefore be 233*l.* 15*s.*; or 6*l.* 3*s.* per acre per annum, besides thinnings. These trees are 60 feet high.

*Experiment 5.*—On the same land larch trees, of only 31 years growth, are as large as the firs of experiment No. 4, which shews that the larch is a much quicker grower. Spruce by them not so large as either. The pinaster of 38 years, larger than the Scotch. The cedar of Lebanon, of the same age, would now cut into planks 12 inches wide.

*Experiment 6.*—A very striking comparison between the larch and the spruce fir, was tried by planting an old gravel pit levelled, surrounded by a plantation of Scotch fir, with those two sorts in alternate rows. The larch is from 6 to 12 feet high; whereas the spruce is but 2 feet on an average.

*Experiment 7.*—A large plantation of many acres of a poor gravelly land at 8*s.* an acre, containing Scotch and spruce firs and larches, is now 16 years old; they are in squares of ten feet, and are worth;

The Scotch, 2*s.* 6*d.* each.

The spruce, 3*s.* 6*d.*

The larches, 4*s.* 6*d.*

At ten feet, there are 435 trees on an acre.

The Scotch, at 2*s.* 6*d.* come to 54*l.* 7*s.* 6*d.*; or per acre per annum, 3*l.* 7*s.*

The spruce, at 3*s.* 6*d.* to 76*l.* 2*s.* 6*d.*; or per acre per annum, 4*l.* 15*s.*

The larch, at 4*s.* 6*d.* to 97*l.* 17*s.* 6*d.*; or per acre per annum, 6*l.* 2*s.*

All three exclusive of thinnings. Suppose, says Mr. Young, we calculate these at no more than paying the rent, tythe, and town charges; and that the larch, in 20 years, come only to 100*l.*, which is, however, under the truth: let any



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	A.	R.	P.	Value per Acre. s. d.	Yearly Value. L. s. d.
At Walesby					
Some pieces of land laid to Bevercotes wood	1	0	27	12 0	0 14 0
A piece of land laid to Nickhaghbush wood	1	2	32	10 0	0 17 0
Clay ground -	2	3	19		1 11 0
At West Drayton.					
School-house plantation - - - -	3	0	0	8 0	1 4 0
Bog ground					
At Gamston.					
Land adjoining the wood - - - -	3	2	0	5 0	0 12 6
Land upon the common - - - -	5	0	0	10 0	2 10 0
Clay ground - -	8	2	0		3 2 6
In Bothamfell and Elksley					
In Patmour - - - - -	41	0	0	5 0	10 5 6
Crookford - - - - -	14	0	0	5 0	3 10 0
In Elksley hopyards, by the fish-pond below } Elksley wood - - - - -	0	2	0	10 0	0 5 0
Bog ground - -	55	2	0		14 0 0
Ash plantations collected.					
In Haughton - - - - -	61	3	13	0 0	20 12 6
Bevercotes - - - - -	51	1	0	0 0	20 10 0
Walesby - - - - -	2	3	19	0 0	1 11 0
West Drayton - - - - -	3	0	0	0 0	1 4 0
Gamston - - - - -	8	2	0	0 0	3 2 6
Bothamfell and Elksley - - - -	55	2	0	0 0	14 0 0
	181	3	32		61 0 0
These 180 acres, now planted, are worth, upon } a moderate calculation, 40s. an acre - - -	180	0	0	40 0	360 0 0

In this case, the expences of planting the hundred and eighty acres are said to have amounted to the sum of 2700*l.* for which his grace will have the additional rent of 300*l.* a-year.

The bishop of Landaff has made the following calculation of the probable profit of converting the waste rocky lands in Westmoreland into plantations with larch. A thousand acres of this sort of land might, he supposes, be inclosed with a circular wall six feet in height, (where the stones can be easily gotten, as they may in most parts,) after the rate of six shillings an acre, or 300*l.* for the whole; five hundred larches two feet in height, (so as to enable them to resist the long grass,) might be planted on each acre for fourteen shillings; hence a plantation of 500,000 larches might be made for 1000*l.* Now 1000*l.* improved at compound interest, at the rate of 4*l.* per cent., would, in 60 years, amount to the sum of 10,519*l.*: this is the accumulated loss attending the inclosing and planting 1000 acres of rocky land in sixty years. The rent of 1000 acres, at one penny per acre, is 4*l.* 3*s.* 4*d.* a-year; in eight years the larches would be out of all danger from sheep, so that the loss of rent ought only to be estimated for eight years; but 4*l.* 3*s.* 4*d.* a-year, though improved after the same rate of compound interest, would not amount to 40*l.* in eight years; say, however, that it would amount to 81*l.*, which is allowing more than two-pence an acre for the annual rent of the land, then would the whole expence attending the plantation in 60 years be 10,600*l.* If the amount of 81*l.* for 52 years be taken into consideration, the expence of the plantation in 60 years will be 11,222*l.* He has here supposed sheep to be shut out of the plantation for eight years; if it should be found that sheep will not crop

the larch, (and from more than one observation he has reason to believe that they will not,) they need not be shut out at all; nor, on districts where nothing but sheep are depastured, need any fence be made. He knows the advocates for close planting, instead of 500, would require 5000 larches for each acre; he is not convinced of the utility of such close planting, except when it is intended to nurse up oaks, or other kinds of wood; but if that mode should be adopted, the thinnings, after twenty years growth, would pay the expence of it. At the expiration of 60 years, suppose that only 250 larches remained on each acre, or that one-half had perished, the probable value of them may be thus estimated. From a great many experiments made by himself and collected from others, he finds the annual increase in circumference of the larch at six feet from the ground, to be an inch and a half on an average of several years; and this inference has been drawn from the actual admeasurement of larches in different parts of England and Scotland, and of different ages, from ten years old to fifty. On this supposition, the larches would measure, one with another, ninety inches in circumference, at six feet from the ground. A larch which measures ninety inches at six feet from the ground, would measure above seventy at twenty feet from the ground; but supposing seventy inches to be the circumference at twenty feet, and the length of the tree to be forty feet, neglecting the remaining top; then will its solid content be eighty-five cubic feet, and the value of the tree-

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tree at nine-pence a foot, above three guineas. But as the trees are supposed to be planted in an high, bleak, barren situation, their annual increase may not be so great as is here supposed; instead of being worth, at sixty years after planting, three guineas a-piece, admit that they are worth only ten shillings each, then would the whole plantation be worth 125,000*l.*, and deducting the whole expence, 10,600*l.* as before estimated, there would remain a profit of 114,400*l.* The present value of 114,400*l.*, to be received sixty years hence, is above 10,000*l.* (interest of money at 4*l.* per cent.) Ten thousand pounds at 4*l.* per cent. purchases an income of 400*l.* a-year: by planting then, a barren estate of a thousand acres, is improved from 4*l.* 3*s.* 4*d.* to 400*l.* a-year, reckoning the value of a reversion as a present certainty. Sixty years is a great part of the life of a man: but it ought to be considered as nothing in the existence of a nation, or even of a family, which is a little nation. The waste lands in this and other countries are a public treasure in the hands of private persons; all of them ought to be converted into arable, meadow, or pasture land, which are capable of admitting, with profit, that kind of improvement; and such of them as will not pay for that mode of improvement, ought to be covered with wood; the high parts, and especially the sheltered dells in the high parts, with larch, and the lower with oak, ash, &c.

And in making plantations of this sort, it has been advised by E. Harries, eq. of Hanwood, to attend to two circumstances, namely, situation and distance. The strong westerly winds are very apt to bend the upper part of the trees, especially if they stand single, or upon sloping grounds. To guard against this, a shelter of Scotch pines should be planted to the westward, some years before the larch. In respect to giving the plants sufficient room: in eight years they may be twenty feet high, and their lateral shoots extend two yards every way from the trunk; and they should not then be suffered to continue nearer than five or six yards; and what are left may continue to be useful building timber. At first planting, a distance of about seven feet should be allowed; they will then be furnished with sufficient lower branches, which give the tree a steady and tapering trunk. The knife should never be applied to them. There is no tree of quicker growth. He has larches that are twenty feet high in seven years growth, and sixteen or eighteen inches round. At thirty years growth, they measure from four to five feet round, at five feet from the earth.

As the larch and fir are so much in use in forming plantations, it may be proper to take some further notice of their properties. In speaking of the larch, the wood, Dr. Anderson observes, is possessed of so many valuable qualities, that to enumerate the whole would appear extravagant hyperbole. It is known to resist water, without rotting, almost for ever. The piles of this timber, on which the houses of Venice were built many hundred years ago, are still found as fresh as when first put in. Stakes of it have been tried in the decoys of Lincolnshire, which, between wind and water, have already worn out two or three sets of oak stakes, and do not yet discover any symptoms of decay. It is also known to possess the valuable quality of neither shrinking nor warping when put into work, nor is it liable to be pierced by worms in our climate. Besides, it is known to be one of the quickest growing trees, remarkably hardy, and extremely beautiful. It is much more easily reared than the oak, and could be spread over a great extent of mountains, if sufficiently bare of herbage, at little or no expence, by the natural shedding of its seeds. It would be valuable not only for ship-plank; but even crooked timbers might be obtained by using a little art to bend it when young. For

flood-gates in navigable canals and wet docks, it would exceed every thing that can be obtained in this climate; for barrel-staves it would be inimitable; and in building it would answer all the purposes to which fir is now applied, being much stronger and more durable than that wood. When it is also adverted to, that it is next to incombustible, it deserves to be strongly recommended to planters in this country, particularly in the most rugged and barren districts; where, at a very trifling charge, estates might be brought to a hundred times their present value. And that it is so much more valuable than the Scotch fir that is now universally preferred to it, for plantations of large extent, in almost every situation. That as it has only been of late introduced into Britain, the qualities of the wood are not sufficiently understood; for before the last thirty years it was cultivated rather as an ornamental tree than with a view to profit. But wherever it has been introduced, it grows so freely; is so beautiful when in leaf; so highly ornamental when covered with its abundant pink blossoms in the spring; and it is so elegant in its form, that it is sure to become a favourite with the planter. However, in the opinion of Mr. Harte, it grows slowly the first four years; but in twenty years will exceed a fir tree, both in height and circumference, that is double its age.

In making a plantation of larch, the thinnings may be applied to a variety of useful purposes, whilst they are yet of a small size. In six, eight, or ten years, according to soil and circumstances, the trees will have attained a size sufficient to be made into hay-rakes. They grow so straight, and the wood is so light, strong, and durable, as to be peculiarly calculated for this purpose; and from its shrinking less than any other wood, these rakes will remain longer firm than those made from any other. About two feet cut off from the root end will form the rake head; and five feet above that, with a very little taken off from the thickness of the under part, will form the handle. No wood is more proper for the teeth of the rake, than some of the red wood of an alder tree, because it is not only tough, but little liable either to split or shrink. The bow may be made of ash, or of the laurel-leaved sweet-scented willow (*Salix pentandra*), which is still better. Nothing is so fit for shafts to hoes; for it is nearly as strong, and much more durable than ash. Handles for brushes, brooms, scythes, &c. would occasion a vast consumption of these small spars. And light, neat, and strong chairs, for ruff bottoms, might be made of larch wood at this age. It is likewise supposed, that nothing will answer better for hop-poles; for one set of these would outlast two or three sets of ash. Hurdles, spars, and gates, may be made of it both lighter and more durable than of any other wood; and when the trees are of a sufficient size, they may be split down for cart-shafts; and in mining countries they might be employed as posts for supporting the roofs of the mines. And the small tops cut off in making these various works, would furnish a neat, elegant, cheap, and durable kind of railing, to be put upon the top of low walls, especially for preventing light sheep from overleaping them. One end might be let into the coping, whether of sod, clay, or lime; and the other end received into a slip of fawn larch wood, with holes bored through it to receive their points. From the straightness of the wood, this kind of rail would be very neat without much expence. In the same manner hen-coops, crates for packing glasses, &c. might be made of those materials. But one of the most extensive and beneficial uses of this kind of small wood, is for the purpose of inclosing. These spars, when the root is thick enough, may be slit up the middle by a saw, and cut into lengths of five or six feet; or if smaller, they may be employed whole. As

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they are always straight, and nearly of an uniform thickness, if driven into the ground for a few inches in a row, at the distance of a few inches from each other, with the split sides all one way, they would make one of the neatest and most complete fences that can be seen. The tops of these uprights may be received into a piece of sawed plank, with holes bored in it for that purpose; and supported at due distances by sloping pieces reaching from the ground to the top.

It may, however, be noticed, that it must stand to be of a sufficient age before the timber acquires its best qualities of strength and durability. The largest of the larch trees on the duke of Athol's lawn at Dunkeld, was measured in the month of March, 1796, and the following are the dimensions of it.

At the height of	Ft. In.	from the ground, the	circumference is	Ft. In.
1	8	-	-	11 11
3	0	-	-	10 0 $\frac{1}{2}$
6	0	-	-	9 0
9	0	-	-	8 6
12	0	-	-	8 2
18	0	-	-	7 11
24	0	-	-	7 7

The whole height was eighty-five feet. There are several larches upwards of one hundred feet in height, which are five or six years younger, but none of so great a girth. The largest of Mr. Drummond's was ninety-seven feet high, but less in circumference.

For a trial, the duke of Athol has applied larch to a variety of purposes, such as mill-axes, flooring in houses, window frames and doors, posts and rails, and boat-building; for all of which it appeared to answer so well, that it is the greatest acquisition of wood ever introduced into Great Britain, especially as it attains a considerable size on high grounds and bleak exposures, where even Scotch firs either die or become stunted. Fishing boats, made of larch under forty years growth, last nearly three times as long as those built of Norway fir. The late violent winds blew down a larch in the duke's lawn of fifty years of age, eighty-six feet six inches in height, containing eighty-two feet of solid wood; for which four pounds sterling was offered as it lay on the ground. And as it is not ascertained whether larch wood is capable of resisting the sea-worm; Dr. Anderson has proposed to prove it by sinking a piece of the sound, well ripened wood, with another piece of found oak wood in the river Medway at Rochester bridge, where it is well known that every other kind of wood is very soon perforated by the sea-worm.

It is therefore concluded, that on account of the valuable qualities of the wood the larch deserves to be cultivated in this country. And another recommendation of it is, its quickness of growth. Eight trees being measured in the spring and autumn of the year 1794, the average of their increase in height was nearly three feet nine inches and a quarter; and one of them increased three inches in circumference at two feet above the ground. In another plantation, the trees at eight years growth measured above twenty feet in height on an average; the trees were from six to nine inches high when planted. At twelve years old they measured, on an average, from thirty-four to thirty-six feet in height. This plantation was on a good soil and in a favourable situation. Nor is it only while the tree is young that it makes these vigorous shoots; for it appears by the measurement of the trees in Dunkeld, that this in a great measure continues even till a period of age, beyond that which they have as yet attained; for one hundred and twenty

feet in fifty years, gives an average of nearly two feet and a half in height for each year of their growth.

Very great improvements have been made in the northern parts of Scotland, by means of plantations of Scotch pine, upon the barest moors, and in the bleakest and most inhospitable situations; the returns of such plantations having been such as fully to satisfy the owners. And when the collateral advantages are adverted to, the improvements, Dr. Anderson thinks, are very great indeed; for in the neighbourhood of such plantations, houses can be reared at so little expence, and the roofs are so much better than ordinary, as to induce settlers to make their dwellings much neater and more commodious than in other places; rails and other dead fences can be so easily obtained, that poor people are first enabled to have good well fenced gardens, and then commodious inclosures of larger extent; the branches afford fuel to the settlers; cutting and manufacturing the wood furnishes employment to many; population is thereby augmented; hence a desire for land to produce the necessaries of life, and a consequent increase of rent to the proprietor. In this way Mr. George Dempster sees fields rapidly converting into cultivated grounds on his estate, and yielding to him ten or twelve shillings an acre rent, not only without any expence to him, but after having derived a considerable profit from the sale of woods of his own planting, which grew upon land that five and twenty years before was not worth, to him, above two-pence an acre, and which might have remained in that state for ages to come had it not been planted. A plantation of Scotch pine can be made at much less expence than any other tree in the northern parts of Scotland, because the young plants can be afforded at a smaller price. In Aberdeenshire, plants of two years old (and above that age no experienced planter will ever buy them) sometimes sell at four-pence a thousand, consisting of 1200; and they seldom exceed eight-pence; and there are men that will undertake to complete the whole inclosing, and planting at the distance of a yard from each other, and supply the deficiencies for five years, at the rate of from ten to thirty shillings the Scotch acre, according to the size of the inclosure, and the nature of the fence.

It is found by experience, that there is scarcely a soil so bad or any exposures so bleak, where this tree will not live, if the plantation be of sufficient extent, and not upon the very summit of high peaked hills. They do not indeed bear the sea air very well; nor is the wood ever of a good quality, or the tree long lived, upon clayey soils. Several persons in the south of England have found, that the pinaster bears the sea blast much better than any other pines. The spruce fir will bear a still more exposed situation than the Scotch pine, and after a few years it shoots up with still greater luxuriance. But the cones not being to be had in an equal abundance, and the plants being more difficult to rear, they are sold at a much higher price. Silver fir in a good soil prospers well, and is a beautiful tree, but the price of the plants is too great to admit of large plantations of them being made.

Where the situation is bleak and much exposed to strong blasts of wind, the plantation must not only be of considerable extent, but the trees be planted very close, so as to be not more than from two to three feet asunder; the more exposed the situation the closer they must be; for it is observed, that until the branches intermingle, and thus serve to give a mutual support to each other, the trees never begin to advance with vigour. Where the plantations are thus thick, there is a necessity for beginning to thin them out from the tenth to the fifteenth year after planting. Where the plantations are extensive, these thinnings sell at a small

a small price, but there are few situations in which they will not do more than pay for the expence of cutting them out. Pruning is likewise occasionally necessary in many sorts of plantations. See PRUNING, THINNING, and SHELTERING Woods and Plantations.

The leaves and branches of the Scotch pine afford a very wholesome nourishment to cattle and sheep. In mountainous countries, where snow sometimes lies upon the ground for many weeks together, the benefit that may occasionally be derived from such plantations will be very great; and the larger branches that are left make excellent fire wood in such cases.

In some districts where the soil is of the loamy and better kinds, there are often large plantations of the fruit-tree, as the apple, pear, and other sorts, in the fields, hedge-rows, &c. See ORCHARD.

PLANTATION *Skreens*, are such tracts or plats of planting as are made round plantations or other woods, for the purposes of screening, protecting, and promoting the growth of their timber trees or underwood.

They are particularly beneficial in these ways, in many exposed situations, as well as for defending the animals from the cold and cutting blasts which sweep over them, as they render the climates of such regions more mild and warm, giving a softness to the air in such exposures.

PLANTE-VER, in *Natural History*, the name of a herb sent over from China, where it is called *hiatsaotonetchom*; that is to say, a plant which at a certain time of the year changes into a worm. The Chinese say, that this is a plant during the summer season; but that in winter its stalk dies, and the root becomes a worm. M. Reaumur has well observed, that in the present improved state of natural knowledge, we can give no credit to such marvellous accounts; and of the roots sent over to the Academy at Paris, it appeared, that only a certain part of each was to undergo this change: this, however, if true, was no less a marvel than that the whole should.

Father Parenin, who sent it to France, observes, in his account of it, that it was a very scarce plant even in China; being found only at the palace of Pekin there, where also it was not native, but brought from the mountains of Tibet, and some other places on the confines of the Chinese dominions. This father had never seen the leaves or flowers of the plant, but only its roots, which were in high esteem there, not only because of their miraculous changes, but from their possessing the virtues of the famous ginseng; but with this advantage, that the use of them was not subject to be attended with those hæmorrhages which frequently affected the persons who take large quantities of that famous root. The roots of this plante-ver are usually about a quarter of an inch thick, and from an inch to three inches in length; but there are much larger in the places where they grow.

These roots had nothing particular in their figure or appearance; but with these the father sent some of those which were supposed to be changed into worms, concerning which he observed, that nothing could more exactly express a worm or caterpillar; the head, the eyes, the feet, and the mouth, being all plainly distinguishable, as well as the several folds and cuttings-in of the body. This account was found to be perfectly true; but the mistake was the want of proper accuracy in the observation; for this body, which was supposed to be the root transformed, had in reality never been any part of the plant, but was found to be really and truly a caterpillar.

This was one of the underground kind, or at least of those which go into the ground to pass their transformation: of these we have a great many different species in all parts

of Europe, and some of them, when they are entering into their nymph state, have a custom of fastening themselves to the roots of plants. Of this kind was the Chinese insect, which, when the time of its change approached, always selected the roots of this plant as of a proper size and dimension for its purpose; and, gnawing off the end, hollowed away the stump, so as to introduce its tail into the cavity; where it remains covered with the bark of the root, which so nicely joins to it, that people who observe it in a slight way cannot but mistake it to be a part of the root, or the remainder of the root a continuation of its body. The more accurate naturalists will, however, easily distinguish the vegetable fibres, which make up the root from the animal ones of the caterpillar; and to an eye accustomed to such researches, the nice joining of the tail to the remainder of the root will easily discover itself. Mem. Acad. Par. 1720.

PLANTED COAT, in the *Manege*. See HAIR.

PLANTIN, CHRISTOPHER, in *Biography*, an eminent printer, born at Mont-Louis, near Tours, in 1514, learned his art under Robert Mace, printer at Caen in Normandy. He settled at Antwerp, where he formed a considerable establishment; and at length he became one of the most eminent printers of the age. He published a number of important works, to the prefaces of which he has subscribed his name, yet it is asserted, that he had no pretensions to learning, and could not even read Latin. If, however, he was defective himself, he employed able and accurate correctors of the press, who brought his editions of literary works to great repute. The most celebrated performance that came from his press was a Polyglott bible, printed after that of Alcalá. In the course of his trade he acquired large property, which he freely employed for the service of learning and its votaries. He died at Antwerp in 1589, with the title of arch printer to the king of Spain. He possessed a fine library, which he bequeathed to his grandson Balthazar Moret. It was the custom of this period for every printer of reputation to adopt a motto, which he inserted in the title-pages of his works. The devise of Plantin was a pair of compasses, with the motto "Labore et Constantia." Moreri.

PLANTING, in *Gardening*, the operation of inserting plants of the fruit-tree and other kinds, seeds, and roots, into the earth, for the purpose of vegetation and future growth.

There are various methods of performing this business in practice for different sorts of plants, seeds, and roots; as hole planting, trench planting, trenching-in planting, slit or crevice planting, holing-in planting, drill planting, bedding-in planting, furrow planting, dibble planting, trowel planting, planting with balls of earth about the roots, planting in pots, &c., all of which are occasionally used by different practitioners in the several branches of gardening, according as the methods are most proper for different particular sorts of plants.

In the *first*, or *Hole Planting*, which is the principal method practised with most sorts of trees and shrubs in the full ground, and which is performed by opening with a spade round holes in the earth, at proper distances, for the reception of the plants, each hole should be dug large enough to admit all the roots of the tree or shrub freely every way to their full spread, without touching the sides of the hole, and about one spade deep, or a little more or less, according to the size of the roots and nature of the soil, so as, when planted, the uppermost ones may be only about three or four inches below the common surface, or as low as they were before in the ground; though in very humid soils, where the water is apt to stand, the holes should be shallower, so as the uppermost roots may stand

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full as high as the general level, or higher if necessary, raising the ground about them, especially when performed in winter. When the soil has been thus dug out, the bottoms should be well loosened; the mould in digging out being laid in a heap close to the edge, in order to be ready to fill in again. The holes being thus prepared, and having slightly trimmed the roots, &c. of the trees, one tree or plant must be placed in the middle of the hole, making all its roots spread equally around; a person holding the plant erect by the stem, while another with the spade casts in the earth about the roots, taking particular care to break all large clods, and trim in some of the finest mould first all round the roots in general, shaking the tree occasionally, to cause the fine soil to fall in close among all the small root fibres; and where the tree stands too deep, shake it up gently to the proper height, and having filled in the earth to the top of the hole, it should be trodden gently all round, first round the outside to settle the earth close to the extreme roots, continuing the treading gradually towards the stem, to which the mould should be pressed moderately firm, but no where too hard, only just to settle the earth, and steady the plant in an upright position: then all the remaining earth should be pared in evenly round the tree, to the width of the hole, raising it somewhat above the general level of the ground, to allow for settling, giving it also a gentle treading; and finishing it off a little hollow at top, the better to receive and retain the moisture from rains, and giving occasional waterings in spring and summer, especially for the choicer kinds of trees and shrubs.

After this, in winter, or early in spring, it may be of advantage to the choicer kinds of trees and shrubs, to lay some long mulch at top of all the earth, both to keep out the winter's frost, and prevent the drying winds and drought of spring and summer from penetrating to the roots before the trees are well rooted in their new situations. But some, instead of mulch, use grafs turfs turned upside down, especially when planting upon grafs ground, or any out-plantations, where turfs of grafs can be obtained; or in orchards, where the ground is in grafs; in which case it may be proper to bank some turfs round the sides and top of each hole, particularly for large trees; which will steady them more effectually, as well as preserve the moisture, if much dry weather should happen the succeeding summer.

*In the second, or Trench Planting*, which is a method sometimes practised in the nursery, in putting out seedling and other small trees and shrubs in rows; and also used for box edgings, as well as sometimes for small hedge-fets, &c. and always in setting out asparagus; it is performed by opening a long narrow trench with a spade, making one side upright, then placing the plants against the upright side, and turning the earth in upon their roots. When used for young seedlings, or other small trees, shrubs, &c. the ground is previously trenched or dug over: a line is then set, and with a spade held with its back towards the line, a narrow trench six or eight inches deep is cut out, turning the earth from the line, making the line side nearly perpendicular: the plants are then inserted in the trench at small distances, close to the upright side, covering in the earth about the roots in planting them; and having planted one row, the earth should be evenly trodden in all the way along, to settle it close, and fix the plants steady, proceeding from row to row in the same manner.

But in planting larger trees, in the nursery way, by this method, a larger trench will be requisite; sometimes a trench one or two spades wide, with proportionable depth, according as the roots of the trees require, is made; and having opened it all the way along the intended row, the trees are placed along the middle of the trench, filling in

some earth to each tree, as placed, one person holding it erect, whilst another throws in the earth; and having placed one row, trim in all the remaining earth evenly; then treading it closely all the way to fix the plants steady, and in a perfectly upright manner.

*In the third, or Trenching-in Planting*, which is also sometimes practised in light pliable working ground, for young trees in the nursery way, and sometimes with edge-fets, &c., being performed by digging along by a line, about one spade in width, and planting at the same time; a line is set; and then having the plants ready, with a spade begin at one end, and standing sideways to the line, throw out a spit or two of earth; which forming a small aperture, another person being ready with the plants, he directly deposits one in the opening, while the digger proceeds with the digging one spade wide, covering the roots of the plants with the earth of the next spit; and another aperture being thus formed, another plant is placed in: the digger, still proceeding, covers its roots, as before, with the next spit of earth; and so on to the end of the row, placing them at about a foot, or fifteen or eighteen inches asunder, according to the size of the plants. When larger trees with more spreading roots are used, instead of digging the trench only one spade wide, two may probably be requisite for the proper reception of the roots; likewise, in forming the openings for the plants, they should be made large enough to receive the roots freely, digging the earth over them as above. After having planted one row of plants, the earth should be trodden evenly along to settle it to the roots, and steady the plants in an upright position. There is another method of this sort of planting, sometimes used for some sorts of roots, such as horse radish sets, potatoes, &c., which is performed by common trenching, placing a row of sets in each trench. The horse radish should be planted in the bottom of the open trench, twelve inches in depth, turning the earth of the next over them; and the potatoe sets be placed about from four to five or six inches deep, covering them also with the earth of the next trench.

*In the fourth mode, or that of Slit Planting*, which is performed by making slits or crevices with a spade in the ground, at particular distances, for the reception of small trees and shrub plants, a slit is made for each plant, which is inserted as the work proceeds; and is practised sometimes in the nursery way, &c., in putting out rows of small plants, suekers, &c., at from about a foot to eighteen inches or two feet high, and which have but small roots: it is also sometimes practised in out grounds, where large tracts of forest trees are planted, and which are planted out at the above sizes, and in the most expeditious and cheapest method.

It is performed in this manner: a line is set, or a mark made; and then having a quantity of plants ready, they are planted, as the work proceeds in making the slits. A man, having a good clean spade, strikes it into the ground with its back close to the line or mark, forming a crevice, taking it out again directly, so as to leave the slit open, giving another stroke at right angles with the first; then the person with the plants inserts one immediately into the second-made crevice, bringing it up close to the first; and directly presses the earth close to the plant with the foot; proceeding in the same manner to insert another plant; and so on till all is finished; which is a very expeditious way of putting out small plants, for large plantations, but should never be employed, where other better methods can be used.

A man and a boy in this method will plant out ten or fifteen hundred plants, or more, in a day.

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*In the fifth, or Holing-in Planting*, which is sometimes used in the nursery, in light loose ground: also, sometimes with potatoes, &c., in pliable soils; the ground being previously dug or trenched, and a line placed: it is thus performed; a person with a spade takes out a small spit of earth, to form a little aperture, in which another person directly deposits a plant, &c., the digger at the same time taking another spit at a little distance, turns the earth thereof into the first hole over the roots: placing directly another plant in the second opening, the digger covers it with the earth of a third spit, and so on to the end of the row.

*In the sixth, or Drill Planting*, which is by drawing drills with a hoe from two to four or five inches deep, for the reception of seeds and roots, and is a convenient method for many sorts of large seeds, such as walnuts, chestnuts, and the like; sometimes also for broad beans, and always for kidney beans, and peas; likewise for many sorts of bulbous roots, when deposited in beds by themselves; the drills for these should be drawn with a common hoe, two or three inches deep; and for large kinds of bulbous roots, four or five inches in depth, covering in the seeds and roots with the earth, always to the depth of the drills.

*In the seventh, or Bedding-in Planting*, which is frequently practised for the choicer kinds of flowering bulbs, such as hyacinths, &c., also for the larger seeds of trees, as acorns, large nuts, and other large kinds of seeds, stones, and kernels: it is performed by drawing the earth from off the tops of the beds some inches in depth, then planting the seeds or roots, and covering them over with the earth, drawn off for that purpose; for which the ground should be previously dug or trenched over, raked, and formed into beds three or four feet wide, with alleys between; then with a rake or spade trimming the earth evenly from off the top of the bed into the alleys, from two or three to four inches deep for bulbous roots, and for seeds, one or two, according to what they are, and their size; afterwards, for bulbous roots, drawing lines along the surface of the bed, nine inches distance, placing the roots bottom downward, along the lines, six or eight inches apart, thrusting the bottom into the earth: but when for seeds, they may be scattered promiscuously; and having thus planted one bed, then with the spade let the earth, that was drawn off into the alley, be spread evenly upon the bed again over the roots or seed, &c., being careful that they are covered all equally the above depth, raking the surface smooth and fine.

This method is in occasional practice, in planting several kinds of the larger prime sorts of bulbous-rooted flowers in beds; and nurserymen also practise it in planting many of their larger seeds, nuts, &c.

And another method of this kind is occasionally practised in some parts, particularly for planting potatoes in low wet grounds, which is by dividing the ground into beds, four feet wide, with alleys two or three feet in width; then digging the beds, and placing the potatoe-fets in three rows along each bed, a foot asunder in the rows: this done, the alleys are dug one spade depth, casting the soil upon the beds over the fets, so as to cover them four or five inches deep; in this way, where the ground is very wet, the alleys drain the moisture from the beds, so as sometimes to afford great crops. Sometimes, in low moist grounds, that are in grass or sward, the beds are marked out as above, and without digging the ground; placing the potatoe fets immediately upon the sward, then digging the alleys, first turning up the sward, and placing it topsy-turvy upon the bed, so as to be sward to sward over the fets; then finishing by applying more earth from the alleys, to cover

in the fets, the proper depth of four or five inches. This, in some counties, is called the lazy-bed method, because the ground is not dug over.

*In the eighth, or Furrow Planting*, which is by drawing furrows with a plough, and depositing fets or plants in them, covering in also with the plough: it is sometimes practised for planting potatoe-fets in fields, and has been adopted in planting young trees for large tracts of forest-tree plantations, where the cheapest and most expeditious method is required; but this method can be practised only in a light pliable ground, and is performed thus: a furrow being drawn, one or two persons are employed in placing the fets or plants in the furrow, whilst the plough following immediately with another furrow, turns the earth upon the roots of the plants. This is not a mode to be much advised.

*In the ninth, or Dibble Planting*, which is the most commodious method for most sorts of fibrous-rooted seedling plants, particularly all the herbaceous tribe; also for slips, offsets, and cuttings both of the herbaceous and shrubby kinds; likewise for some kinds of seeds and roots, such as broad beans, potatoe fets, Jerusalem artichokes, and horse-radish fets, with numerous sorts of bulbous roots, &c.; it is expeditiously performed with a dibble or setting-stick, by making a narrow hole in the earth for each plant, inserting one in each hole always as the work proceeds.

Having a dibble or setting-stick, it is used by thrusting it into the earth in a perpendicular descent, in depth as the particular plants, &c. may require; directly inserting the plant, seed, or fet, as each hole is made, closing it immediately by a stroke of the dibble. In setting any kind of plants, slips, cuttings, &c., having long shanks or stems, it is proper to make holes a proportionable depth, to admit them a considerable way in the ground: for example, cabbage-plants, favoys, &c. should be planted down to their leaves; slips and cuttings should be inserted two parts of three, at least, in the ground; being particularly careful in dibbling-in all sorts of plants, to close the holes well in every part about the roots; by striking the dibble slantways into the ground, so as to strike the mould first firmly up to the root and fibres, at the same time bringing it close to the stem. See **DIBBLE**.

*In the tenth mode, or Trowel Planting*, it is performed with a garden trowel, made hollow like a scoop, and is useful in transplanting many sorts of young fibrous-rooted plants with balls of earth about their roots, so as not to feel their removal.

The trowel is employed both in taking up the plants and planting them.

*In the eleventh, or Planting with Balls of Earth about the Roots*, which is the removing of the plant with a large ball of earth about its roots, so as by having its roots firmly attached to the surrounding earth, it still, during the operation, continues its growing state, without receiving any, or but very little check from its removal: this is often practised more particularly for the more delicate and choicer kinds of exotics, trees, shrubs, and herbaceous plants; and occasionally for many of the fibrous-rooted, flowery plants, annuals, perennials, and biennials, even in their advanced growth and flowering state, when particularly wanted to supply any deficient compartments; though it is not so eligible for bulbous-rooted kinds: likewise, when intended to remove any sort of tree or plant out of the proper planting season, as very late in spring, or in summer, it is proper to transplant it with a good ball of earth, to preserve it more certainly in a state of growth. Some trees and shrubs are more difficult to remove with a ball than most kinds of the herbaceous fibrous-rooted plants,

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though many of the tree and shrub kinds having very fibry roots, also readily rise with good balls.

In transplanting any of the tree and shrub kinds by this method, if they grow in the full ground, the operator must be careful to begin to open a trench with a spade at some distance from and round the stem, perhaps a foot, or two or three, according to the size of the tree and expansion of the roots, digging a sort of trench all round, a spade or two wide, or more if large trees, and in depth below all the roots; all the time having great care not to disturb the ball or mafs of earth between the stem and trench, but preserve it as entire as possible. When the whole has been detached, the plant should be removed into the situation for which it is intended, with the whole of its ball about its roots.

When trees or shrubs, with balls to their roots, are intended to be sent to considerable distances, they should be placed singly in oſier baskets, in order to preserve the ball, having a basket for each tree; the baskets to be of an upright make, in width and depth in proportion to the ball, with two handles at top, especially if large, and generally worked rather open at the sides, as sometimes the basket and all is placed in the ground, when the plant cannot be readily removed without danger of breaking the ball of earth about it.

In respect to the method of planting in pots in general, having the pots and mould ready for the reception of the plants, previous to planting them place some pieces of tile, pot-ſherds, or oyster-shell, &c. over each hole at the bottom of the pots, to prevent the holes being clogged and stopped with the earth, and the earth from being washed out with occasional waterings; also to prevent the roots of the plants getting out: then having secured the holes, put some earth in the bottom of each pot, from two or three to five or six inches or more in depth, according to the size of the pot, and that of the roots of the plant; then insert the plant in the middle of the pot upon the earth, in an upright position, making its roots, if without a ball of earth, spread equally every way; directly adding a quantity of fine mould about all the roots and fibres, shaking the pot to cause the earth to settle close thereto: at the same time, if the root stand too low, shake it gently up; and, having filled the pot with earth, press it gently all round with the hand, to settle it moderately firm in every part, and to steady the upright posture of the plant, raising the earth however within about half an inch, or less, of the top of the pot, as it will settle lower; for some void space at top is necessary to receive waterings occasionally: as soon as the plant is thus potted, give it directly a moderate watering to settle the earth more effectually close about all the roots, and promote their rooting more expeditiously in the new earth; repeating the waterings both before and after they have taken root, as occasion may require.

In transplanting plants in pots from one pot to another, they may in general be shifted with the whole ball of earth contained in the pot about their roots entire, so as to preserve the plant all along in its growing state, as scarcely to shrink or retard its growth by the operation; for plants growing singly in pots, and of some standing, whose roots and fibres have established themselves firmly in the earth, will readily remove out of the pots with the entire ball in one compact lump, surrounding all the roots and fibres, retaining their growing state by still drawing nourishment from the surrounding ball of earth.

The removing of plants from one pot to another with balls, is in some cases to be avoided: as where a plant appears diseased or in a bad state of growth, as it is most probable the fault is in the root of the earth; therefore, it is

eligible to shake the whole entirely out of the earth, in order to examine its roots; and trim off all decayed and other bad parts; then, having a fresh pot, and some entire new compost, replant the tree, &c. therein.

In potting plants from the full ground, or beds of earth, &c., if they have been previously pricked out at certain distances, and have stood long enough to fix their roots firmly, many sorts may be potted with balls, particularly most of the herbaceous, fibrous-rooted kinds, and many of the shrubby tribe, by taking them up carefully with the garden trowel, or with a spade, as may be convenient, according to the size of the plants; and, if necessary, pare the balls round to fit the pot.

Seedling plants, or those raised from seed beds, by their growing to close together, rarely admit of potting with balls to their roots; so that when it is intended to pot such, they must be drawn out of the earth with the root as entire as possible, and be potted separately in small pots, shifting them occasionally into larger.

Sometimes in pot-planting, to save room, and for other purposes, several small plants are planted in each pot, especially when designed as nursery-pots, to receive either small seedlings, offsets, slips, cuttings, &c., just to strike them, and forward them a little at first, either in hot-beds, or for removing them to different situations, such as occasional shade, shelter, &c., and in which some sorts of small slips and cuttings are sometimes planted many together, in one or more wide pots, especially where large supplies of some particular sorts are required, such as myrtle cuttings and pipings of pinks, &c., sometimes to the amount of a hundred or two of these small sets in one capacious pot or wide store pan. The small seedlings, slips, cuttings, offsets, &c., when they are a little forwarded, or properly rooted, and shoot a little at top, should be all potted off, in proper time, each in a separate pot, especially if plants of any duration; giving them small pots at first, and as they increase in size shifting them into larger ones.

When any large growing plants, such as orange and lemon trees, or any other kinds, are become too large for pots, they should be shifted into tubs: these tubs should be made of full-inch thick staves, and adapted to the size of the respective plants; each tub to be well hooped with iron, and furnished with two hooked or bow iron handles at top, by which to move them, either by hand, or, when very large tubs, to receive poles between two men for moving the plants where wanted; having holes at the bottom of the tubs to discharge the superfluous moisture; placing some stones, &c. to prevent the holes being clogged with the earth: the method of planting and transplanting being the same as in pot planting.

*The twelfth Method, or Planting in Pots*, is practised to all tender exotics, in order for moving them to shelter occasionally, such as all kinds of green-house and hot-house plants; and likewise for many sorts of hardy flowering plants, for the convenience of moving them occasionally to adorn particular compartments; and for the convenience of moving some curious sorts when in flower to occasional shelter from the sun's rays and excessive rains, in order to preserve their beauty and prolong the time of their bloom; such as the fine auriculas, carnations, &c.

In planting in this way, it is highly requisite carefully to adapt the sizes to the size and nature of the different plants intended to be potted: if small plants, begin first with small pots, one plant only to each pot, especially if to remain; but according as the different plants advance in growth shift them into pots one or two sizes larger, which may be requisite to many sorts once a year, to others once in two or three years, according to circumstances.

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Garden pots for this use are of several regular sizes, from two to sixty in a cast, distinguished at the pot-houses accordingly; as twos, sixes, twelves, sixteens, twenty-fours, thirty-twos, forty-eights, sixties, or sixty-fours, &c., each pot having one or more apertures at bottom to discharge the superfluous moisture. They are sold by the potters at so much *per cast*; large and small, all of a price; those of only two in a cast the same as those of sixty; and from two shillings to half a crown or three shillings *per cast* is the general price. See *Pot, Garden*.

Sometimes, instead of baskets, small young trees and other plants with balls, intended to be sent to any distance, are put separately in pots, and when they are to be placed in the full ground, each should be turned out of the pot with the ball entire.

Trees and other plants that have generally grown in pots, where they have been of some standing, have the whole earth by means of the numerous fibres formed into one compact lump, so that it will readily come out entire and firm; or to such as do not so easily quit the pot, a long blade of a knife, or some other thin instrument, may be thrust down between the outside of the ball and pot all round, and it will then readily come out, either in drawing by the stem of the plant, or by striking the edge of the pot with something; or, if small plants, you may turn the pot mouth downward, and strike the edge gently against any firm substance. In replanting those potted plants, if the sides of the ball of earth are much matted with the fibres of the root, it is proper to pare off the grossest part, together with a little of the old earth, especially if to be planted in pots again; then put it in a pot a size larger than before, filling up all round with fresh mould, finishing with a moderate watering.

With respect to the proper state and preparation of trees for planting, it may be observed that young trees, both of the fruit and forest kinds, are the most suitable, and succeed best, as from three or four to six or eight feet in height, and from three or four to five or six years old. See **FOREST, DWARF, and STANDARD TREES.**

In forest-trees, the straightest, most vigorous, and thriving plants of the respective kinds should always be chosen.

In preparing for planting, in taking up the trees out of the nursery, the greatest care is necessary in raising them with as great a spread of root as possible, which is often ill attended to, especially when large orders of plants are to be drawn in a hurry. The ground about the trees should always be opened with the spade widely round the roots, and deep enough to get to their bottoms without hacking and cutting them with the spade, but so as to raise each plant with all its roots as entire as possible. After having taken up the trees out of the nursery, &c., it is also of great moment to have them replanted as soon as possible in the places allotted for them; for although by properly covering the roots with litter, or, if sent to any considerable distance, by tying them in bundles, and packing them up with plenty of straw about the roots, and afterwards closely matted round, they may be preserved in tolerable good condition a fortnight or longer, yet, where it is possible to plant them the same day, or in a day or two after, before the small fibres are shrunk or dried, it will be of much advantage in the first growth of the trees; but when this cannot be done, they should be immediately laid in the ground in a trench.

In preparing for planting, the roots must have occasional trimming, not however to retrench or reduce any but the maimed and decayed parts; therefore previous to planting examine the root, and cut out all such parts as have been broken or damaged in taking up, and any casual decayed parts or other blemishes, being careful to leave all the found

roots every where entire; leaving also all the small fibres that are fresh and vigorous, only trimming off such as are become dry and mouldy; suffering all the main roots to remain, mostly at full length, except just to tip off their ends a little on the under side, sloping outward; and reduce any very long stragglers, and shorten long perpendicular tap-roots, more particularly of fruit-trees, to prevent their running down into a bad soil, and to promote their throwing out others horizontally.

With regard to the preparation of the heads of the trees, the principal care is to trim off the straggling shoots and branches from the stems, leaving the heads for the generality entire, only just retrenching very irregular branches, and shortening any very long stragglers; always suffering the main or leading top shoot to remain at length, particularly in forest-trees, and all others that are to grow to a lofty stature. Fruit-trees, however, sometimes require a more accurate regulation of the head preparatory to planting, particularly dwarfs for espaliers and walls. If the fruit-tree is taken from the nursery at one year old from the budding and grafting, and with its first shoot from budding and grafting entire, this first shoot must necessarily be shortened or headed down to force out lateral wood below, to furnish the bottom properly; but this heading down is not necessary at the time of planting, but should remain till spring, until the tree has taken fresh root and begins to shoot; for the head remaining greatly promotes the rooting; when in March or the beginning of April, head it down within half a foot, or five or six eyes of the insertion of the bud or graft, and the shoot so headed will throw out, from its remaining lower eyes, several lateral branches the ensuing summer.

If it is two, three, or more years old from the budding and grafting, and the first shoots were headed down in the nursery at the proper time, it is proper to plant it with its whole head entire, only retrenching any irregular branch, or any very luxuriant shoot; or thin out the worst of such as are evidently too close or crowded, leaving however all the regular branches at full length, except just to reduce any very long Rambler.

For new planting trees it is very improper to retrench the branches too severely, and cut all that remains short, as is very often practised, on a supposition of strengthening their roots, which however has often the contrary effect; for the branches and leaves imbibe the refreshing influence of the air, &c., which, being conveyed to the roots, proves nutritional, and contributes exceedingly towards vegetation, and consequently promotes the rooting afresh more expeditiously and effectually. Besides, by a severe retrenching, and a general shortening, of fruit-trees in particular, in most sorts the very parts where fruit would have been soon first produced are cut off, and it will probably cost the tree two or three years growth to furnish new branches equal to those cut away, as well as retard its bearing in proportion. And it often happens by such a general amputation of the branches of all new planted trees at the time of planting, that they, for want of branches to collect vegetative nourishment, either make very little progress in shooting for two or three years after, or sometimes, when they do shoot, throw out a profusion of unnecessary wood from the remaining eyes or buds.

Therefore if young fruit-trees at planting, whether dwarfs or standards, are furnished with five or six or more good regular principal branches, of one, two, or more years growth, it is improper to retrench any part of them, and disfigure the tree, particularly apples, pears, plums, and cherries, which should at all times be but sparingly shortened; and since several good branches being already obtained in the proper parts to give the head its first regular form, they in

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their turn readily furnish more; and if there is a vacancy in any part, it will be better to endeavour to fill it by stopping some of the young shoots produced the summer after planting, by either pinching or pruning them in May or June the same year to three or four eyes, or cutting them down to that length in the winter or spring following. Some fruit-trees, however, such as peaches, nectarines, &c., against walls, require most of their young shoots to be shortened annually.

Forest-trees, &c., in their preparation previous to planting, after being drawn out of the nursery, should only have the blemished roots trimmed, and all branches from the lower part of the stem pruned off, cutting the lower ones close, the others to two, three, or four inches, particularly the deciduous kinds, leaving the head always tolerably branchy, and mostly entire; not to trim away all the branches to one leading shoot only, as is often practised, but leave a proportionable share of the upper more erect branches, to form some tolerable head, and only just retrenching the lower stragglers, very long rambling luxuriant, and very irregular growths, to preserve a little regularity; being particularly careful to leave always the top or leading shoot perfectly entire, unless it is decayed, or is very crooked, bending much downwards, &c., in which cases, if any straight shoot is conveniently situated, the crooked part may be retrenched down to the straight shoot, which leave entire to run up in height, as without a leader a tree can never aspire to any considerable stature; for the leader, by its annual erect shoot, gradually increases the length of the stem, and, as it advances, sends out a supply of laterals to furnish the head, branching and spreading.

In planting large tall trees, where it is designed to form shade, shelter, or blind as soon as possible, very little reduction of the branches of the head should be suffered, only to reduce any very irregular growers.

In removing pretty large trees of any sort with considerable heads, especially when very spreading or crowded, it may be proper to reduce the whole regularly in some proportion to the root, that the winds may not have too much power to incommode it after planting; in which cases it may be necessary to retrench or reduce some of the most extensive lower branches, and thin out some where much crowded, reducing others down to some convenient lateral branch they may support, so as each reduced branch may, notwithstanding its reduction, terminate in a leader, having its top entire, not to exhibit naked ends of branches, standing up like stumps.

In respect to the preparation for planting of all the shrub kind, only just trim the straggling under branches and shoots from the lower part of the stem, retrenching any luxuriant of the heads that seem to shoot away very irregularly and vigorously at the expence of the neighbouring branches, and reducing long ramblers, &c., just to preserve a little regularity.

All new planted tall trees should be staked as soon as planted, in order to support them steady every where till they are well rooted and have somewhat established their roots, that winds may not overset, or otherwise incommode them; particularly all trees of six, eight, or ten feet high, and upwards; one tall stout stake being placed to each tree, or more, if the trees are of large size, sharpening the lower ends, and driving them firmly into the ground near the stem; or if larger trees, place it slantways, at a little distance, so as its top reach the upper part of the stem, on the opposite side to that most exposed to the winds, in which it will have the greatest effect; but large trees with full heads, should generally have very tall strong stakes, three to each tree, placed triangular-ways, in an oblique or slant-

ing direction, afterwards binding the stems of the trees firmly to the stakes, previously wrapping some soft substance, such as hay-bands, &c., round them, at the part where it is to be fastened to the stakes, in order to save the bark from being rubbed off against the stakes by the motion of the winds, which is more particularly necessary to tall plants that are much exposed. Large trees of considerable stature, with full heads, are often supported with ropes suspended from the top of the stem three different ways, straining them tight, and the end of each rope staked securely down to the ground; so that whatsoever way the wind blows the ropes stay the tree still in its upright position.

Such new planted trees as are exposed to cattle should each be well fortified all round the stem with thorn bushes, briars, furze, &c.

The general season of planting, for all sorts of trees, is autumn and spring, as from the beginning of the decay of the leaf, in October, until December, for the former; though evergreens may be begun to be transplanted towards the middle or latter end of September, and continued till December. And for the spring planting, February and March are the principal time, but may be continued occasionally until April; and several sorts of tender young evergreens succeed best when planted the beginning of that month, or later. Much, however, in this business, must depend on the soil and state of the weather.

In preparing to plant herbaceous fibrous-rooted plants, care is to be had to remove them with good roots; young seedlings, &c., especially require particular care in drawing them with proper roots. When they are to be taken all clean up, they may be readily loosened and raised out of the earth with some instrument with all their fibres entire; but when they are only to be thinned, they do not admit of this, as it would disturb the remaining plants, so must be drawn out by hand carefully, with as much root as possible.

Many sorts of fibrous-rooted plants, however, are so hardy, and apt to grow, that if taken up almost any how, with a little root, they will strike; it is nevertheless advisable to use care in drawing all sorts for planting with tolerable roots, as they will, in proportion, make more progress in their future growth. And as to any trimming preparatory to planting, very little is wanted, only in some sorts, just shortening very long naked spindly roots, and trimming any straggling fibres; though in numbers of plants of this tribe hardly any trimming at all is required, either in root or top.

*PLANTING Timber Trees*, in *Rural Economy*, the act of making plantations with these sorts of trees, which is a practice that has lately been more attended to than formerly; probably from the advantages of it being more fully understood, and more correctly ascertained. The particular sorts of land that may be converted to this purpose with the greatest chance of profit, have been already pointed out.

In the accomplishing the business, the principal difficulty consists in properly adapting the trees to the nature of the soil, as, unless that be the case, the success is far from so great as it would otherwise be. The land should also be in a proper state of preparation for the reception and growth of the trees, and the work be executed at a proper season in a proper manner, and at suitable distances, according to the nature and quality of the soil, and that of the trees; the whole being well fenced from the attacks of cattle.

*Soil.*—The particular kinds of soil best adapted to the cultivation of the different sorts of timber trees, and in which some or other of them will be found to grow in the most perfect manner, are gravelly or light sandy soils, with free porous subsoils; gravelly or sandy loams on porous subsoils; loamy,

loamy, sandy, or gravelly soils on retentive subsoils; gravelly, chalk or chalky loams on porous subsoils; loamy clays or clayey loams on porous subsoils; and strong clayey or loamy soils on retentive subsoils. Likewise, thin moorish heathy soils on gravelly or porous subsoils, also on clay or retentive subsoils; and besides these kinds of land, there are, as has been seen above, many other thin poor sorts of waste, in different parts of the kingdom, which are not fit for raising any other descriptions of plants, that might be converted with great advantage to this purpose, as the diminution in the quantities of timber and other wood every where now almost begins to be seriously felt.

Mr. Smith, in the "Survey of Argyleshire," states, that the grounds there which ought to be marked out for this improvement, are such as are mentioned below. The best land would no doubt bear timber best; and if arable land could be spared for the purpose, the return might be expected to be in proportion to the value of the soil. But in this county little or no arable land, meadow, or good pasture, ought to be laid under planting. It should have only those waste grounds which are capable of this improvement, and of no other. And of these we may reckon, first, those extensive dry moorlands and moor-lands, in the hollows and on the declivities of hills, especially in the inland parts of the county. These lands are generally covered with short heath, mixed with so little grass, that they are not worth 6*l.* the acre. The trunks of trees generally found in them give, however, a sufficient proof of their aptitude to grow timber, and they can never be turned to better account than by planting them; and that with the same kind of timber that is found in them. This is generally fir, and sometimes oak. Whatever it be, follow nature, and you cannot err. It may be said that some of these situations are far from water-carriage. But the whole county is so indented with seas, and so well accommodated with roads, that almost every mountain is accessible by the one or the other. Or, if any of them be not, still it may be profitable to plant it, were it only with a view of converting a great part of the wood to the purposes of extracting from it turpentine, tar, pitch, rosin, and of making pot-ashes. And another kind of ground which ought to be planted, and of which we have large tracts, is that which is covered with brush-wood, such as hazel, birch, &c. seldom allowed by the cattle to rise above two or three feet high. Here nature, which could not be mistaken in the soil, has planted wood, though it has not been allowed to grow, and has marked out the ground as fit for planting. This brush-wood will prove an excellent nurse to young plants, by giving them shelter till they raise their heads above it; after which they will destroy the brush-wood by excluding the sun and air from it, and reduce it to a manure which will help their growth. Among this brush-wood, however, there may sometimes be found some sprouts of oak and ash, which ought to be cut over a few inches above the ground; after which they will shoot up, and thrive exceedingly, from the abundance of roots which they have to nourish them. Patches of dwarfish oak, which the cattle never allow to rise one foot from the ground, are also common in many parts of the county. If these spots were brought within the enclosure of a plantation, and the bushes cut over a little above the surface of the ground, they would soon be valuable. In England, even oak plants are often cut in this manner after one or two years, when they have taken to the ground, and the second shoot is trusted to for the tree; as it is found to grow with greater luxuriance than the first, which was checked by transplanting.

Stools of natural wood, wherever they are, furnish much room for planting; and at a trifling expence, when they are

already enclosed. Every vacancy in them ought to be filled up with oak, ash, elm, and other valuable kinds of timber. The ground is suitable for planting; the natural wood will shelter it; and thus it will thrive well, and improve the copice. The properest time for improving a natural wood with planting, is immediately after it is cut, when the fences are in best repair, and when the sun and air will get at the plants which may be set among bushes of less value. These bushes should afterwards be cut down, if they are found to hinder the growth of the planting. The duke of Argyle has done much in this way, and Lord Stonefield, Sir James Campbell, and several other proprietors, have thus improved their natural woods very considerably. In one year, Captain Campbell, of Kintarbet, with a spirit yet uncommon amongst the most of the proprietors of this county, planted among his natural woods no less than 20,000 trees of valuable timber. At this rate, he will, in a few years, lay the foundation of a sure and large fortune.

And a fourth kind of ground, that should be devoted to planting in this situation, is, that on which a number of venerable native firs are still growing. These memorials of our former forests are not unfrequent in some of the upper parts of the county, particularly in Glenety and Glenurchay; and they deserve more attention than they have hitherto met with. From the seed which they shed in winter, and which is driven to a distance by the storm, a beautiful plantation rises up in the spring; but when the cattle are driven up to the mountains in summer, this precious crop, the hope of future forests, is for ever destroyed. This is the more to be regretted, as the quality of this fir is so excellent, as not to be surpassed by any in the world. The seed of this fir is precious, and a single cone of it, if possible, should not be lost. But then, in order to preserve its valuable quality, it should be sown where it is meant it should grow, without passing through the medium of a feed-bed or nursery. And it appears necessary, in order to preserve the quality of the timber, that we should follow nature, and sow the seed directly where we intend the tree should grow. The seed too will thrive where plants would fail.

After some hesitation about parting with any thing we call arable ground, he mentions one other kind of land, which it may sometimes be proper to devote to planting. He means some high fields, which, under the old system of cultivation, were subject to the plough, but never to much advantage. These poor gravelly fields were manured by folding cattle on them at night. But now, where this system is given up, they lie neglected, and many of them are already covered with heath. With little expence, and much advantage, they might be converted to plantations. The earthen dikes which surround them might be faced with stones, of which the dikes themselves would furnish a great proportion. The tops of the dikes might be planted with firs, if not with quicksets, for more fence and shelter. The fields should then be ploughed, and, if at all convenient, dressed with some lime or other manure, and sown with the seed of the native Scotch fir, and with acorns. By this preparation of the ground, the trees would thrive amazingly, and the wood retain its native quality. There are many thousand acres of waste land in this country as well as Scotland, that might be converted to plantations with great advantage, and which are fit for nothing else.

A tabular view, taken, with some alteration, from the Agricultural Survey of the County of Kent, shewing the nature of the soil in which different sorts of timber trees are found to succeed in the most certain and perfect manner, with the uses to which they may be applied in different cases, is given in the following table.

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Surface Soil.	Subsoil.	Common Growth.	Planted Growth.	Uses of.
Heavy and gravelly loams.	Heavy loam with chalk.	Birch, hornbeam, oak, ash, hazel, beech, &c.	Oak, ash, chefnut, willow, lime, walnut.	Timber, hop-poles, cord-wood, hurdles, bavins for bakers, and lime.
Sandy loams.	Heavy loams.	Birch, hornbeam, oak, ash, hazel, beech, &c.	Elm, beech, Weymouth pine, common spruce.	Timber, hop-poles, cord-wood, hurdles, bavins for bakers, and lime.
Flinty strong loam.	Heavy loam.	Ditto.	Willow and chefnut.	Timber, fencing-poles, and as above.
Gravelly and sandy loams.	Gravelly loam.	Ash, beech, oak, hazel, &c.	Chefnut, ash.	Hop-poles, fencing-poles, and all as above.
Gravelly, sandy and flinty loams.	Heavy gravelly flinty loam.	Ash, beech, hornbeam, and oak.	Ash, beech, larch, &c.	Timber, fencing, hop-poles, cord-wood, for charcoal, bavins, &c.
Flinty dry poor gravelly loams.	Chalk at two feet depth, with gravelly loam.	Beech, oak, &c.	Beech, larch, &c.	Cord-wood, bavins, and hop-poles.
Flinty and gravelly loams.	Chalk four feet, with deep gravelly loam.	Ash, oak, hazel, &c.	Ash, larch, &c.	Cord-wood, hop-poles, bavins, stakes, ethers, &c.
Ditto.	With a few flints, but nearly as above.	Oak, hazel, beech and ash.	Chefnut, ash, and willow.	Hop-poles, fencing-poles, stakes, cord-wood, &c.
Lightish black loam.	Dry sandy gravel.	Birch, elm, ash.	Ash, elm, &c.	Various uses in husbandry.
Flinty gravelly loams.	Strong loam, with flints.	Oak, ash, beech, &c.	Ash, &c.	Poles, bavins, cord-wood, &c.
Chalky, flinty gravelly loam.	Chalk, with some gravelly loam.	Ditto.	Ditto.	Ditto.
Gravelly loam.	Heavy, flinty, and poor loam.	Oak, ash, hazel, and beech.	Ash, oak, &c.	Common produce a few poles, cord-wood, bavins, &c. Plantation many poles, and the above.
Gravelly and chalky loams.	Gravelly loam with chalk.	Oak, ash, &c.	Ash and chefnut.	Poles, cord-wood, &c.
Gravelly loam.	Ditto.	Ash, oak, and beech.	Oak, larch.	Ditto.
Ditto.	Gravelly loam and heavy loam.	Ditto.	Scotch pine.	Ditto.
Sandy gravel.	Gravelly and sandy loam.	Ash, oak, beech, and Scotch pine.	Larch, chefnut, &c.	Poles, stakes, ethers, &c.
Stone shatter and gravelly loam.	Strong loam with ragstone.	Oak, hazel, birch, &c.	Birch, oak, &c.	Oaken tillers, small timber poles, &c.
	Gravelly loam with some stone.	Oak, birch, aspen, hazel, and ash.	Ash, chefnut, and willow.	Fencing-poles, hop-poles, cord-wood, &c.
Gravelly loam.	Gravelly loam, with some stones.	Oak.	Chefnuts.	Hop-poles, fence-poles, &c.
Sandy loam.	Gravelly loam.	Birch, oak, hornbeam, &c.	Chefnut, &c.	Fence-poles, hop-poles, &c.
Sandy loam and stone shatter.	Gravelly loam with ragstone.	Oak, beech, birch, hazel, ash.	Ditto.	Ditto.
Gravelly loam and stone shatter.	Deep loam, heavy clay and gravel.	Ditto.	Ditto.	Ditto.
Ditto.	Gravelly loam.	Ditto.	Ditto.	Ditto.
Gravelly and sandy loam.	With strong clay and loam.	Oak and ditto.	Ash, larch, &c.	Poles, fire-wood, &c. as above.
Gravelly loam flinty.	Gravel with clay and some flint.	Scrubby oak, hazel, &c.	Oak, ash.	Timber and ditto.
Wet spungy land.	Moist and boggy earth.	Alder, willow.	Alder, osier, willow, &c.	Hurdles, hop-poles, &c.
Drier ditto.	Ditto more dry.	Poplar.	White poplar, willow.	Hop-poles, &c.
Light sandy loam.	Dry gravelly earth.	Mountain ash, ash.	Scotch pine, silver fir.	Hop-poles.
Light gravelly loam.	With dry gravel.	Ash.	Sycamore.	Timber, turnery, &c.

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Mr. Nicol states, that in planting, where it is performed on the more elevated or mountainous tracts, warmth and shelter are to be considered, as without these the trees seldom thrive in a perfect manner. In such situations there is, in general, the most difficulty and the least progress made in the raising of timber trees; the success of the planter depending greatly upon fixing or such sorts of timber trees as may in future become the most highly valuable, on planting thickly with plants of not too large a size, and on a considerable plot, or extent of ground both in length and width being planted. In these unfriendly situations to the growth of trees, small plants must consequently be chosen and planted thick on the ground; as the winds are very prejudicial to trees of a large stature, by loosening the roots, and frequently breaking the fibres; but though this is the most disadvantageous situation for planting, it is possible, with proper care in the above respects, to rear young timber in it. Where it is intended to cover a mountain from its base, it will be most conveniently done by planting round the base in the first instance, rising gradually; by which means an artificial shelter will be forming, from the progress that will be made by the trees that were first planted, especially if the extent is such as to require several seasons to complete the planting. The portion first planted should be pretty extensive, in all such cases especially where shelter is principally intended.

The kinds of trees to be chosen for such situations must be regulated, in a great measure, by the soil. The pine would perhaps be found to flourish most, but the larch is preferable as a nurse. The mountain-ash, the beech, the ash, the sycamore, the birch, the fir, &c. may all be planted with reasonable hope of success; and where the soil is deepest and richest the oak. But in low sheltered situations, where the inconvenience of exposure to the winds is obviated, timber-trees may be planted with greater certainty of success; the chief care necessary in this case being to fix on trees of a proper kind, and placing them at proper distances, according to their sorts and sizes. As these situations admit of most kinds, on the more sheltered parts, the oak, larch, elm, beech, horse-chestnut, walnut, lime, spruce, and silver fir may be suitable; and on the less sheltered portions, the ash, birch, sycamore, hornbeam, mountain-ash, and fir, with a mixture of larch. It may likewise be noticed that the banks of rivers and canals are mostly favourable for the planter's purpose, and most sorts of timber and other woods may be raised in such situations; the oak, elm, poplar, willow and osier, according as they are more or less dry; but the preference must depend on the local circumstances of the different cases.

But in situations near the sea-coast, as they are in general inimical to the growth of timber, the beech and sycamore will be mostly found the most proper, as bearing the sea air better than other sorts. At least they are of great use in nursing the other sorts of trees till they acquire sufficient strength. It is advised in such places, as the best mode of performing the business, to plant, where the banks rise high, in the face of them much within the level of the tops, in order to afford a screen for the trees within till they have attained a sufficient height; but when they are flat, to have recourse to planting in belts, commencing the work as close to the edge of the water as possible, putting the plants in, in a very thick manner in the first rows, as at the distances of not more than about thirty inches, and using such plants as are stout, well rooted, and not more than eighteen inches growth.

*Raising the Plants.*—The different methods of providing the plants have been already noticed under the head of

PLANTATION; but the most useful are either by raising them in nurseries near the spot to be planted till of proper sizes, or by purchasing them from nurserymen in the neighbourhood. For extensive tracts of ground the first is the most advantageous mode, but when only small tracts are to be covered, the latter may often be the most advisable. In forming the nursery grounds, great attention should be paid to having them properly situated in respect to warmth, and the soil well broken down and enriched by proper manures. In Nottinghamshire, in the duke of Portland's extensive plantations, a well situated and sheltered valley, as contiguous as possible, is fixed upon for the purpose, and a space of ground sufficient for the purpose is well fenced in; large boarded gates being placed at each end, with a road down the middle proper for admitting carriages to convey away the young trees. When after the fence is completed the ground on each side the road is trenched about twenty inches deep, which may be done for about 3*l.* 10*s.* or 4*l.* per acre, according as the land is more or less gravelly. It is best done in the spring, when the planting season is over. If, after the trenching, two or three chaldron of lime be laid on an acre, the land will produce an excellent crop either of cabbages or turnips, which being eaten off by sheep in the autumn, will make the land in fine order for all sorts of tree seeds: but as the oak is the sort of tree cultivated in general, this is the method pursued in raising and managing that most valuable species. In the autumn, after the cabbages or turnips are eaten off, the ground requires nothing more than common digging. As soon as the acorns fall, after being provided with a good quantity, sow them in the following manner: draw drills with a hoe in the same manner as is practised for peas, and sow the acorns therein so thick as nearly to touch each other, and leave the space of one foot between row and row, and between every fifth row the space of two feet for the alleys. While the acorns are in the ground, great care must be taken to keep them from vermin, which would very often make great havoc amongst the beds, if not timely prevented. Let this caution serve for most other sorts of tree seeds.

As soon as the acorns are come up, the beds require only to be kept clean from weeds till they want thinning; and as the plants frequently grow more in one wet season, where the soil is tolerably good, than in two dry ones, where the soil is indifferent, the time for doing this is best ascertained by observing when the tops of the rows meet, which is done when that is the case by taking away one row on each side the middlemost, which leaves the remaining three rows the same distance apart as the breadth of the alleys. In taking up these rows, the workman ought to be careful neither to injure the plants removed, nor those left on each side. The rest of the young oaks being now left in rows at two feet apart, let them again stand till their tops meet, then take up every other row, and leave the rest in rows four feet asunder, till they arrive to the height of about five feet; which is full as large a size as is ever wished to be planted. In taking up the two last sizes, the method is to dig a trench at the end of each row, full two feet deep, then undermine the plants, and let them fall into the trench with their roots entire; as very much of their future success depends on this point of their being well taken up. And a similar mode is necessary with other sorts of trees in providing them for the purpose of planting.

But in the place of this method, the acorns as well as other seeds of trees are sometimes sown at first where they are to grow and remain. This method, the author of the Argyleshire Report says, makes the best timber; the plants suffer no checks, nor feel the inconvenience of a change of soil,

soil, and the expence of raising an extensive plantation in this manner is very trifling. Besides, it is found that these seeds of trees will grow in situations in which the plants have failed. The most expeditious way of sowing the seed in this manner, is, by a party of three men working together. The first with a paring spade takes up a turf, the second stirs the earth with a spade, and the third distributes the seed and covers it. If any of the seedlings fail, they may be replaced by young plants raised on a similar soil, which will soon be reconciled, when very young, to their change of situation. Indeed the oak, when planted from the seed, or at most from the seed-bed, adapts itself wonderfully to almost any soil or situation; though it delights most in that which is very dry and gravelly.

In many cases, after the plants have been kept in the nursery or seed-bed for about two years, they are removed to a nursery of this kind, and planted in rows or lines twelve or more inches apart according to their sort, and from three to five in the rows, where they remain for two years longer, and are then finally planted out.

*Preparation.*—As soon as the plants have been raised in some of these methods, so as to be in a state for planting out, the next point to be attended to, where the ground has been properly drained, is that of preparing it for their reception. In this business great care is necessary, as much depends upon its being in a good condition for the reception of the plants. It is performed by the plough or the spade according to the different circumstances of the land. When coarse plants prevail, such as heath, furze, broom, &c. they must be fully destroyed by stubbing them up, burning, or otherwise clearing them away. When burning is practised, the ashes should be blended with the soil, as they are found of great service in promoting the growth of the plants; in the opinion of Mr. Nicol. But the mode of preparing by the plough on tillable scites, where the soil is thin, is the cheapest and most effectual of any; as where the land has been in tillage, it wants nothing more than two furrows and an equal number of harrowings, to render it fit for the reception of the trees. But where it is in lay, a crop of oats, &c. should be taken the season before planting; or if it is stubborn, a second crop, perhaps of beans, turnips or potatoes, will be necessary; previously ploughing and harrowing well, and laying the land up in a perfect method. A trench plough is frequently used for this purpose, which stirs the ground to twelve or thirteen inches. In this method it is essential to plough to the full depth each time, in order that the roots of the plants may strike down more freely into the soil.

Where the spade is employed, which must be the case in steep situations where the plough cannot come, and where there are rock, stones, or other obstructions; the best planters advise, that the holes or pits should be made to the full depth of the soil, and sufficiently large according to the size of the trees. For those of eighteen or twenty inches in height, whose roots occupy about nine inches when spread out, holes of fifteen inches in diameter may be sufficient. This must, however, be regulated by the judgment of the planter. And as it is of great advantage to the trees that the turfy matter should be well broken down and reduced before the time of planting, it may be useful to have the holes made a proper length of time before the trees are put in, to admit of this being fully effected, especially on the drier and more light soils, where there is a smaller proportion of this material.

Mr. Nicol states, that from the desire of early appearance it has been too much the case to plant forest-trees of too great growth. It is, however, found, that there is not only

much saving of expence, but a much greater certainty of success, in planting small young trees than such as are large and of greater age. Such as have been in the nursery two, three, or four years according to their kind, may in common be the most advantageous as timber trees. He also thinks that deciduous trees of all kinds, except the larch, of from three to five feet in height, being carefully raised with good roots, will generally succeed. He has, however, shewn, that a one year's seedling larch, nursed one or at most two years, will outdo all others of its kind in any soil or situation, and therefore advises planting trees of this age only. Firs of any kind will succeed better if under than above thirty inches, even in the most favourable soil and situation. Most generally those of fifteen or eighteen inches in height are to be preferred. From this view of the subject, it may occur to some, that to plant seedlings only would be the most advisable and least expensive method. That it would be the least expensive method is obvious; but, that it is most adviseable, except for the Scotch and spruce firs, may, he thinks, be disputed.

As the chief property of any young tree intended for transplantation, consists in a multiplicity of healthy fibres; hence the necessity of nursing, in kindly soil, for a year or two, all tap-rooted plants, for the attainment of this object, and that we may commit them to the less genial soil and more untoward situation with greater probability of success. For, whether shall we suppose the plant which has both root and branch to make, or that which has the latter only, in the first season after so important a change of habit, is more likely to succeed?—the latter, certainly. From which alone may be demonstrated the cause why plants of this description surpass those of greater size, as stated above. These are raised with unbroken, tufty, and fibry roots; those with maimed, lank, fibreless ones; nor do they, with the utmost skill and attention, bear such proportion to the top. Consequently the fibrils cannot afterwards, by the utmost efforts of human art, be induced so immediately to seek pasturage for the sustentance of the trunk. For though lopping may in a great measure obviate this, injury is thereby done to the tree. In all soils and situations it is the safest and least expensive method to plant young healthy well rooted plants, where they can be procured.

*Distances, Manner, and Time of Planting.*—Mr. Nicol's directions are, that for the most exposed, bleak scites, and barren soil, from thirty to forty inches may be considered as a good medium; varying according to circumstances. For in an extensive tract, it will hardly happen that there is not a variety of soils. Some parts may be deeper and more loamy; others more gravelly and rocky. In the former, the greater distance may be adviseable; in the latter the lesser. But for less exposed scites, and where soil is found above six inches in depth, from four to five feet will be a good medium; varying the distances according to circumstances as above. And for belts, stripes, or clumps, whose breadth or diameter does not exceed a hundred feet, lying in a bleak situation, and thin soil, the margin, on all sides, should be planted at not more than two feet apart: the interior at three. Those lying on a more sheltered situation, and of deeper soil, may be allowed distance according to circumstances. But narrow stripes, or small clumps, even if the soil may be termed good, should generally be planted thicker than a more extended mass, that the plants may afford each other shelter.

For the more sheltered scites, where the soil is deep, good, and where apparently every plant will grow, six feet will be a good medium distance. Wider than this he cannot approve in any case whatever; because at this distance, the

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plants have room to grow till their thinnings become useful. But even where this is not an object, there is a greater; namely, that the plants may not grow too squat in their infancy, and that the pruning hook be not much wanted in the formation of stately timber. It is supposed that he who plants too thin, with the idea of saving trouble in thinning, deviates as widely from the right path, as he who thins none at all. It is, therefore, contended that thick, rather than thin planting, is the safer side to err on. By which mode also, there is a more equal crop on the ground, beeting or filling up vacancies being much less necessary. And in opposition to the common practice, it is supposed that thick planting is most necessary where the plants are largest, as the greatest number die in these cases. The Nottinghamshire Report states, that in the duke of Portland's plantations, where trees of various sizes are planted in an irregular manner, the number upon an acre is usually about two thousand; but in other cases the number is frequently much larger.

With respect to the manner of setting the trees in the plantations, it is probably the best method, except where vegetable crops are to be cultivated between, to plant without any regular order, though the line or row manner is frequently practised, as being the least troublesome and expensive of any that can be adopted. With respect to the most advantageous manner of blending or intermixing the trees, it is observed that some have advised the planting in groups, to prevent the supposed injury of trees of different sorts growing together; others, however, prefer the mixed method, not only as affording a better means of ascertaining what sorts of timber trees succeed best, but as enabling the planter to protect them more effectually. It has, however, been suggested by Mr. Nicol, that it matters little whether we plant in distinct groups or in indiscriminate mixture; provided, in the latter case, we ultimately retain the most profitable and flourishing kinds only: for, with the proviso that most of the kinds evidently adapted to the soil and situation be planted according to the mode of thick planting, a sufficiency of them will remain, after all others are thinned away, for a full and final crop. For instance: if it should be supposed that the soil is best adapted to the oak; that it is desirable to raise the most valuable kinds rather than the decorative; and that, exclusive of the larch for nurseries, and a few firs to enliven the borders, six kinds are to compose the mixture; plant two oaks for one elm, two elms for one beech, two beeches for one ash, two ashes for one birch, and two birches for one sycamore. And thus will the plantation at once be formed, in uniform gradation, of kinds most likely to succeed each other, in the case of either disagreeing with the soil or climate; and which also succeed each other in respect of value as timber: doing justice, at least, to the patriotic intention of the planter, should the first and more valuable kinds fail.

It is conceived that in all situations, and on all soils, except those termed humid, and which are adapted to the aquatic kinds only, the larch is, without doubt, the most proper nurse, and therefore should take preference of all others for this purpose. But on sub-humid, or loamy soils, the Lombardy poplar and Huntingdon willow are good substitutes; and, when variety is the object, ought to be mixed with the larch, for the purpose of nursing the other more valuable kinds. And that on elevated, poor sites, the mountain-ash, for the first ten or fifteen years, is outdone by the larch only in the office of nursing, and is justly admitted for the sake of variety. In all situations, this plant grows quickly in youth. In maritime situations, the sycamore is likewise evidently useful for this purpose. Few

trees, except the above, grow faster in youth; and none are more patient of the sea-breeze. Consequently, when the site is much exposed thereto, this tree should be freely planted in mixture with the larch for nursing the oak, beech, elm, &c. if the intention be the culture of ship-timber. It is likewise suggested, that the common pine may sometimes be useful in this view, and afford greater variety. The proportion in which trees of this sort should be employed, must necessarily depend on the peculiarity of the situation, and other circumstances. Some recommend in thin soils, and bleak situations, tree for tree; and in less exposed situations, and better soils, one nurse for two principal trees; and in most sheltered situations, with good soil, one nurse for three, four or five principal trees may be a sufficient allowance. On the most exposed and bleak situations, where the soil is evidently sterile, the safest way is to plant too many rather than too few, as, unless well sheltered, the timber trees never succeed well in exposed situations.

The time of planting these sorts of trees with the most advantage, and the greatest chance of success, differs according to the nature of the soils and the plants, as well as in the state of the weather. It has been stated, that in the more porous dry soils, with the hardier sorts of trees, the autumn, as from the middle of October to the latter end of November, may be the most suitable; as they will be better established against the summer heats, which are often destructive to new planted trees. But in the more heavy soils, especially those of the clayey and loamy kinds, and with less hardy sorts of trees, the early spring season, as from the middle or latter end of February to the beginning of April, may be the most proper. The condition of the land should be particularly attended to in this sort of work, as it is equally improper to plant when either in too dry or too moist a situation. At a time when the soil is neither wet nor dry, the operation of planting is most easily, and also most successfully performed. The mould adheres not to the spade, nor does it run in; it divides well, and with little trouble intermingles with the fibres; nor, in the operation of treading and setting the plant upright, is it wrought into a mortar, to the evident prejudice of the plant, whatever weather may ensue. Consequently, on a retentive soil, it cannot be proper to plant in time of rain, nor in many cases for a day or two afterwards; nor after a fall of snow, until for several days it has entirely disappeared. Whereas on a dry absorbent soil, it may be very proper to plant in time of gentle rains or immediately after heavy ones.

Another circumstance which ought to be regarded in this business, is the difference in the forwardness of the vegetation of different sorts of trees, as it should regulate in some degree the time of planting, where those of the same sorts are only made use of. In this view, it is advised that the larch, elm, sycamore, lime, horse-chestnut, mountain-ash, birch, alder, poplar, willow, and some others, should be put in by the beginning of March; and that the oak, birch, ash, chestnut, hornbeam, &c. be finished planting by the beginning of April at the latest. The best season for planting of many trees of the evergreen kind, such as the Weymouth pine, spruce, Scotch, silver, and other firs, is supposed by some to be in the latter end of July, or in the beginning of the following month, when the weather is inclined to be moist or cloudy.

*Planting out.*—It is advised, that as soon as the trees have been taken up with care, so as to injure the fibres of the roots as little as possible, and a few of the bruised extremities cut off, they should, when intended to be planted in mixture, be put together in proper proportions, and conveyed in this

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way to the place where they are to be planted. They must then be distributed on the ground, at the pits or other places, in order to be ready for the planters, as by this means much time is saved, which would otherwise be lost in sorting. But to prevent the roots from getting too dry, it is necessary not to take up or bring on to the land more than can be planted in a short space of time. But where only one or two sorts of trees are to be planted, the usual practice of carrying the plants along as the planting proceeds, may be the most convenient method for performing the work. And the operation is the best and most readily performed by two persons: a man to do the work, and a boy to hold the plants. In executing the work, the labourer first stirs the mould well in the holes or pits that have been previously prepared, rendering it level, and fit for the reception of the plant: or forms new holes according to the mode of planting that is adopted. The boy then places the plant in the hole, with all the fibres of its roots regularly spread out and unconfined, to the depth of about an inch more than it had stood in the nursery, holding it perfectly upright; while the man gently fills in the loose mould, moving the tree a little up and down to let it mix with the roots: the remainder of the earth is afterwards put in; and the labourer proceeds to the preparation of the next hole, leaving the boy to set the plant erect and close the mould about it, which in soils of the stiffer sorts should be only performed in a light manner, but in those of the drier kinds, as the sandy and gravelly, as closely as possible. In this way the work is to proceed till the whole is finished. There are other methods of planting sometimes made use of, such as by forming slits, nicks, or openings of other kinds, so as just to press in the roots of the plants; but these, from the roots being confined, and having no loose fresh mould to shoot into, seldom answer in any perfect manner. It is well remarked that much of the success of the planter depends upon this part of the work being well executed; but that great care should be taken, particularly where the land is inclined to moisture, or of a retentive quality, not to plant at too great a depth. In planting on steep, it is directed that the trees should be placed towards the declivity, being put in at the lowest part of the opening; which should, in completing the work, be left the highest, by which the moisture may be better preserved for the support of the plant.

It seems not improbable, the author of Practical Agriculture says, but that in many cases and situations, the planting of small trees of the timber kind might be performed with great convenience and expedition by the assistance of a plough suitable for the purpose, as has been sometimes practised in setting hedge-plants. Where trees of considerable growth are planted, great attention is necessary to have them well secured against the wind, as, when they become loose, the fibres are so broken and destroyed that they soon die. This has been commonly effected by means of staking: but as in this way the trees are often in danger of being injured by rubbing, a practice of ramming the earth closely about the roots has been attempted, which in some soils, and upon small scales of planting, has, it is said, been found to succeed; but in extensive concerns it is wholly inadmissible, from the trouble that must attend it.

When the plants have been all put in, it is a practice in some cases to sow or set the plantations with acorns, as it is found that sown oaks as well as other trees exceed in growth those that are planted. This work is done either by paring off the surface with a mattock, and setting the acorns with a dibble, or by putting them in slight drills by the hoe, at the distance of about six inches. The best season for performing this business is in April, and it may be performed

the first, second, or third year after planting the ground, but the first or second is probably to be preferred. It is advised that great care should be taken to preserve the acorns well, by exposure to the air and frequent turning, as they are very apt to sprout soon after being gathered. The proportions of these and other sorts of seeds that are necessary are thus stated in the Nottingham Agricultural Report.

### Quantities per Acre.

- Of acorns from four to six strikes.
- ash keys, four strikes.
- Spanish chesnuts, one ditto.
- hawthorn berries, one ditto.

It is necessary to bury the ash keys and hawthorn berries one year in beds or pots of sand before they are sown in these situations.

When the trees have been thus planted out, it is advised as necessary not to lose sight of them, as the young plants should be kept clean and free from the annoyance and choking of coarse weeds of all kinds, for at least three or four years. This may be done by the hoe in many cases; but some have recourse to the culture of different sorts of crops in this view. In this method, however, much care is requisite not only to avoid injuring the plants, but to guard against the soil being too much impoverished, and their growth thereby retarded in too great a degree. And where coarse plants abound, such as broom, furze, briars, and other similar productions, in all the less exposed situations, they should be wholly cut up and destroyed; but in bleak exposures it may be a better practice to only clear them to a distance round the trees, so that they cannot do any injury by rubbing or striking against them, the others being left for the purpose of sheltering and protecting the young trees during their young growth. There is another circumstance likewise to be attended to in this business, which is that of filling up the vacancies that are caused by the dead plants. Where the ground is kept perfectly clean, this may be done at any proper season; but in other cases, when the dead plants cannot be so easily detected, it may be better to delay the business to the third or fourth year, when the deficiencies can be more perfectly ascertained. If this sort of business be done too early, many plants are frequently removed that would have thrown out from the bottom, on account of their not being dead in that part, though wholly gone in the top. It is advised that the plants employed in filling up these vacancies should never be too large, as where that is the case they are liable to die or be destroyed.

There is still another kind of planting which is frequently practised, but the propriety of which is not yet well ascertained. It is that of setting hedge-rows with trees of the timber kinds. The utility of the practice is maintained by some on the ground of the degree of shelter and ornament that it affords, and its being a means of raising much useful timber at little or no expence; while others condemn it as highly improper, and disadvantageous, on the principle that much injury is not only done to the crops, especially when of the grain kind, by the dropping and the spreading of the roots, but also to the hedge in the places where they stand, by their producing gaps and openings. The author of a late practical work, however, suggests, that though some inconvenience and injury may be sustained where this sort of planting is much in use in arable districts; yet from these being, in a great measure, capable of being obviated by proper training and pruning, and from the naked appearance which is exhibited without them in a country, but more particularly from the vast benefit that may be derived

derived in the way of timber; it would seem that some extent of planting in this method should be attempted in most situations. Mr. Middleton hints, that it would not be an easy matter to make an accurate estimate of the advantages to be derived from such a measure: but in order to gain a slight idea as to the quantity of hedge-row timber, let it be considered that, in well-inclosed, hedged, and cultivated districts, the hedge-rows occupy from a twentieth to a tenth of the whole surface. Even including the common fields, and cultivated slopes and borders of sheep-downs, the average quantity of land occupied by hedge-rows, at this time, amounts to a twentieth, or two millions of acres; all of which might probably be made to produce timber: more than half of it, however, would no doubt do so, by only trimming the lowest side branches off to the height of ten, twelve, or fifteen feet from the ground. This would permit the air to circulate freely, give every advantage to the occupier's crops; and would leave sufficient tops upon the trees for the purposes of growth and rural ornament. Under management like this, the hedges would every where present healthy, vigorously-growing, and handsome timber; and would add very much to the profit of the land owner, to the security of the country, and to the pleasures of the traveller. But in performing the work of planting in such cases, the nature of the land, the sort of husbandry that it is principally conducted under, and the kind of exposure in which it is placed, should be well considered, and the sort of trees properly adapted to it. In dry soils, most sorts of timber trees, as has been seen, may be planted; but in those more stiff and heavy kinds, the oak and the elm may be the most proper. The ash should, perhaps, never be had recourse to where the land is almost wholly under the plough; but on lands under the grazing or grass system, it may be planted with advantage. In bleak and exposed situations, the beech is probably the best for this use; and near the sea the sycamore. The trees where the ground is mostly in an arable state should be planted at much greater distances than under the contrary circumstances, and such trees as run most to tall clear stems be preferred. It is recommended that the young trees in this sort of planting should be larger than in other cases, being kept in the nursery two years longer than has been here advised, and shifted so as to produce more fibrous roots. When about five or six feet in height they are probably in the most suitable condition for being planted out in these places.

In these cases the most proper time of planting in hedge-rows is, when the fields are first broken up from the state of lay, as at that time, from their being continued in the state of tillage for some years, there will be less trouble and expence in protecting them from cattle by palings, &c. as well as less danger of their being injured by the browsing of live stock, as they will be advanced beyond their reach by the time the land is restored to grass.

Where the planting is performed in the hedge-rows of grass lands, the trees must always be perfectly secured from the croppings of cattle, as well as the rubbing of sheep, or other animals, as where this is not the case, they are soon much injured, and frequently wholly destroyed. The work of planting in these cases should be carefully performed in the manner described; and where the trees do not stand perfectly firm against the wind, be well secured by stakes, or other proper means, as they never thrive well when not kept perfectly fast and steady in the soil.

The practice frequently employed of converting the hedge-row timber trees into pollards by lopping off their

top branches, should constantly be guarded against as much as possible, as it is the destruction of timber. Where pollards abound, they are mostly cropped once in from about nine to fifteen years, the profits of which, in general, belong to the tenant. This work should be constantly finished by the end of February, where it is in use, at the latest.

As soon as the trees have acquired a tolerable growth, it is necessary, in all cases, to attend to the proper pruning and thinning of them occasionally as they advance, in order to prevent their growing in an improper manner, and their injuring each other by rubbing or being drawn up weak. In the first intention, they are therefore to be occasionally looked over after the third season from planting, and such headed down, or otherwise cut, as may appear necessary for their more regular or perfect growth. When this has been done, the only thing further will be to encourage a leader, by shortening all the other branches that appear to contend with it to nearly one-third of their length, in order to strengthen their main stem. The whole that is afterwards necessary, is that of properly thinning the strong top branches, and those on the sides, which may be done by a light bill. This is, however, only applicable to trees of the forest kind; those of the fir and evergreen sort require nothing more than the regulation of their leaders, as that of keeping them single where they throw out double. The less the side branches are touched the better in all these sorts of trees, as they are very much hurt by cutting.

On the whole, planting is without doubt the most productive improvement that can be attempted on poor barren lands, and ought to be promoted in every way as much as possible; but more especially by the application of some sort of stimulus which could have the effect of inducing the proprietors of lands, in situations proper for it, not to neglect such undertakings, as being the best means of rendering their properties fully and completely valuable, as well as of benefiting the country.

PLANTING, *Inverse* or *Reverse*, is a method of planting, in which the ordinary position of the plant, or shoot, is inverted; the branches being set in the earth, and the roots reared into the air.

Agricola mentions this monstrous way of planting, which, he assures us, succeeds very well in most, or all sorts of fruit-trees, timber-trees, &c. both foreign and domestic. Bradley affirms his having seen a lime-tree in Holland, growing with its first roots in the air, which had shot out branches in great plenty, at the same time that its first branches were turned into roots, and fed the tree.

The industrious Mr. Fairchild has practised the same with us, and gives us the following directions for the performance of it.

Choose a young tree of one shoot, of alder, elm, willow, or any other tree that takes root readily by laying; bend the shoot gently down, till the extreme part be in the earth, and so let it remain till it has taken good root. This done, dig about the first root, and gently take it up out of the ground, and raise it till the stem be nearly upright; in which state stake it up.

Then prune the roots, now erected in the air, from the bruises and wounds they received in being dug up; and anoint the pruned parts with a composition of four parts of bees'-wax, four of tallow, two of resin, and two of turpentine, melted together, and applied pretty warm. Then prune off all the buds or shoots upon the stem, and dress the wounds with the same composition, to prevent any collateral shootings; and leave the rest to nature.

PLANTING, in *Architecure*, denotes the laying the first

courses of stone on the foundation, according to the measures, with all the exactness possible.

PLANTS, in *Botany* and *Vegetable Physiology*, compose the second of the three kingdoms of nature. To define the limits of these, the animal, the vegetable, and the fossil kingdoms, has exercised the ingenuity of philosophers. When fossils were believed to possess a vegetative power, which even Tournefort maintained, the chief difficulty lay in distinguishing them from plants; but since the mineral kingdom has been ascertained to depend on the laws of chemistry alone, all ambiguity on that side of the question is removed. On the other hand, in proportion as the physiology of plants has been studied, their anatomy, nutrition, development, and propagation, have been found so nearly allied to similar functions in animal bodies, that increase of knowledge has but augmented our perplexity. The following are among the most approved definitions, intended to discriminate between animals, vegetables, and fossils.

Jungius, in his *Isagoge*, p. 1, says "a plant is a living body destitute of sensation; or it is a body attached to some certain place or seat, whence it derives powers of nourishment, increase, and propagation." Linnæus cites this passage inaccurately in *Phil. Bot.* 1. He observes, in a manuscript note, that the floating sea-weeds, and *Conservee*, form an exception.

Boerhaave considers a plant as "an organic body, attached by some part of itself to some other body, whence it derives nourishment."

Ludwig asserts that "natural bodies constantly endowed with the same form, and with locomotion, are animals; those which have the same form, without locomotion, are vegetables; and those which have a diversity of form, are minerals." To this Linnæus well objects, the perfect regularity of form in crystals of the same species; and the want of locomotion in several animals.

Tournefort, in his *Isagoge*, 54, says "a plant is an organic body, always furnished with roots, perhaps always with seeds, and almost always with leaves, flowers, and stems."

Alston has defined vegetables as nourished by pores situated in their external surface, animals by vessels in their internal one.

Linnæus, in *Phil. Bot.* 1, has given the most neat, and generally approved, definition. "Stones grow. Vegetables grow and live. Animals grow, live, and feel."—To which he has subjoined, in manuscript, "*et se movent, motu possibili;*" i. e. and are endowed with a certain degree of spontaneous motion.

Difficulties attend all these positions. The want of sensation in vegetables cannot be demonstrated, nor are appearances to the contrary wanting; so that it can never serve for a practical mode of discrimination, nor as a basis for any philosophical argument.

Mirbel, in his *Traité d'Anatomie et de Physiologie Végétales*, has remarked "that plants alone have a power of deriving nourishment, though not indeed exclusively, from inorganic matter, mere earths, salts or airs, substances certainly incapable of serving as food for any animals, the latter only feeding on what is or has been organized matter, either of a vegetable or animal nature. So that it should seem to be the office of vegetable life alone to transform dead matter into organized living bodies."

To this we can find no exception. However inconvenient, and indeed impossible to be used, as a practical test, it appears to be a sound philosophical distinction, between the animal and vegetable kingdoms. The fossil or mineral

kingdom is essentially distinguished from both, by the want of an organized structure, developed and increased by absorption; and of a vital principle, essential to the performance of all the functions on which their health, growth and propagation depend.

Plants come under consideration, in various points of view, in a work like the present. For what concerns their anatomy and physiology, see ANATOMY, BARK, CORTEX, CIRCULATION of Sap, FECDATION of Plants, LEAF, FLOWER, GERMEN, PERICARP, &c.: for their scientific arrangement and discrimination, see BOTANY, CLASSIFICATION, FLORA, FIGURES of Plants, GENUS, SPECIES, NATURAL Orders, SYSTEM, &c. See also LICHENES and MUSCI. The reader is requested to correct two typographical errors in the latter article, column eighth, line 18 from the top, for *sinks* read *sbrinks*; and line eight from the bottom, for *sexual* read *esexual*.

PLANTS of Britain, the natural spontaneous production of our soil and climate, have formed the subject of many separate botanical works. More or less perfect catalogues of British plants have been published by How, Ray, Petiver, Wilson, Hill, Jenkinson, and others, besides a number of local Floras. Ray's *Synopsis Methodica Stirpium Britannicarum* first set the example of a systematic arrangement, and scientific discrimination, of our native vegetable productions, and has been the foundation of all that has been done since. This excellent work was accommodated to the Linnæan system and principles, with augmentations, by Hudson, and has led the way to the labours of Withering, Lightfoot, Robson, Broughton, Wade, Hull, Curtis, Relhan, Abbott, and the writer of the present article, whose *Flora Britannica*, extended as yet no farther than the end of the *Musci*, was written on a comparison of all that had before been done, with the specimens of the Linnæan herbarium. This Latin work has been followed up and illustrated by the figures, and English descriptions, of the same author's *English Botany*, drawn, engraved, and published by Mr. Sowerby, which is just now come to a conclusion, in thirty-six volumes octavo, with 2592 coloured plates. In the progress of this latter work, since the *Flora Britannica*, or the *Compendium Fl. Britannicæ*, appeared, about 150 species have been added to the British list; even in the first twenty-three, or phænogamic, classes of the Linnæan system. We propose, therefore, in the present article, to exhibit a complete catalogue of the Phænogamic plants of Britain, as far as the present state of our knowledge extends, with a reference throughout to the *English Botany*, in which, with two or three exceptions only, they are now all separately delineated. These amount to 1450. So full an enumeration of British plants has no where, hitherto, appeared; and we shall take the opportunity of correcting mistakes of the *Flora Britannica*, respecting certain species erroneously there admitted. This catalogue is arranged according to the Linnæan system, with those slight alterations only, which are adopted in the *Fl. Brit.* and accounted for in the author's *Introduction to Botany*. Each plant is mentioned by its generic and specific names, in Latin and English; then follows a reference to the volume and plate of *Engl. Bot.*—The particular situation, duration, and flowering month, of every species are subjoined. Whatever the reader may wish further to know, is to be sought under the name of each genus, at its proper place in the alphabet. New species, not there mentioned, are particularly described or defined, and various necessary corrections are given respecting preceding articles, as in the classes *Tetradynamia* and *Gynandria*. New matter, regarding genera

# PLANTS.

nera belonging to the posterior part of the alphabet, will hereafter be found there. An asterisk (\*) is prefixed to every species, presumed to be of foreign origin, or but imperfectly naturalized here; and a cross (†) to those concerning which some error is suspected, they being, not at present, found in the places indicated, and perhaps having had other species originally mistaken for them. The Latin names throughout correspond with the *Flora Britannica* and *English Botany*, except where the contrary is expressed by a synonym between crotchets.

The 24th class, *Cryptogamia*, though not omitted, is necessarily treated in the most compendious manner, it being impracticable at present correctly to enumerate the British species of that class. Even a partial catalogue of them would also have extended this article too far. They are nearly all, except *Fungi*, included in the *English Botany*.

## Class 1. MONANDRIA.

### Ord. 1. Monogynia.

#### SALICORNIA. Glasswort.

1. *S. herbacea*, common, or samphire. vol. 6. pl. 415. Sandy sea shore. Annual. 8th and 9th months.
2. *S. procumbens*, procumbent. 35. 2475. Sea shore. Ann. 8.
3. *S. radicans*, creeping. 24. 1691. Muddy shores. Perennial. 9.
4. *S. fruticososa*, shrubby. 35. 2467. Sea-coast, rare. Per. 8, 9.

#### HIPPURIS. Mare's-tail.

1. *H. vulgaris*, common. 11. 763. Pools and ditches. Per. 5.

#### CHARA. Chara.

1. *C. vulgaris*, common. 5. 336. Muddy waters. Ann. 7.
2. *C. hispida*, prickly. 7. 463. Pools and ditches. Ann. 7, 8.
3. *C. flexilis*, smooth. 15. 1070. Pools and lakes. Ann. 7, 8.
4. *C. translucens*, great transparent. 26. 1855. Pools, rare. Ann. 6, 7.

This is the larger plant of Vaillant, fig. 8, mentioned as a variety of *flexilis* in our article CHARA, n. 4.

5. *C. nidificans*, proliferous. 24. 1703. Sea ditches. Ann. 7, 8.

"Smooth, transparent, without prickles. Leaves cylindrical, elongated, all simple. Anther often stalked."

More slender and branched than the last, but more stout and firm in habit than *C. flexilis*.

6. *C. gracilis*, slender. 30. 2140. Pools, rare. Ann. 9.

"Smooth, transparent, shining, without prickles. Lateral branches repeatedly forked; their segments awl-shaped, acute. Leaves awl-shaped, often branched."

Much smaller and more tufted than the last. When dry almost colourless, shining like glass.

#### ZOSTERA. Grass-wrack.

1. *Z. marina*, sea. 7. 467. Sea ditches. Per. 8, 9.

### Ord. 2. Digynia.

#### CALLITRICHE. Water Star-leaf.

1. *C. aquatica*, common. 11. 722. Ditches and pools. Ann. 4—10.

## Class 2. DIANDRIA.

### Ord. 1. Monogynia.

#### LIGUSTRUM. Privet.

1. *L. vulgare*, common. 11. 764. Woods and hedges. Shrubby. 5, 6.

#### FRAXINUS. Ash.

1. *F. excelsior*, common. 24. 1692. Woods and hedges. Tree. 4, 5.
2. *F. heterophylla*, simple-leaved. 35. 2476. Woods, rare. Tree. 4, 5.

See FRAXINUS, n. 8. var. b.—Vahl's name, *heterophylla*, is preferable to *simplicifolia*, as a few leaves are often ternate, or even pinnate, on the same tree with the simple ones.

#### CIRCEA. Enchanter's Nightshade.

1. *C. lutetiana*, common. 15. 1056. Shady dank places. Per. 6, 7.
2. *C. alpina*, mountain. 15. 1057. Rocks and woods. Per. 7, 8.

#### VERONICA. Speedwell.

1. *V. spicata*, spiked. 1. 2. Chalky pastures. Per. 7—9.
2. *V. hybrida*, Welch. 10. 673. Mountains, rare. Per. 7.
3. *V. officinalis*, male, or common. 11. 765. Barren heaths. Per. 5, 6.
4. *V. saxatilis*, blue rock. 15. 1027. Highlands. Per. 7.
5. *V. fruticulosa*, flesh-coloured shrubby. 15. 1028. Highl. Per. 7.
6. *V. alpina*, alpine. 7. 484. Highland rills. Per. 7, 8.
7. *V. serpyllifolia*, smooth. 15. 1075. Meadows and pastures. Per. 5, 6.
8. *V. Beccabunga*, brooklime. 10. 655. Rivulets. Per. 7.
9. *V. Anagallis*, water. 11. 781. Rivers and ditches. Per. 7.
10. *V. scutellata*, narrow marsh. 11. 782. Sandy ditches. Per. 7, 8.
11. *V. montana*, mountain. 11. 766. Chalky woods. Per. 5, 6.
12. *V. Chamadrys*, germander. 9. 623. Groves and hedges. Per. 5.
13. *V. agrestis*, procumbent. 11. 783. Fields and gardens. Ann. 4—9.
14. *V. arvensis*, wall. 11. 734. Dry ground. Ann. 5.
15. *V. hederifolia*, ivy-leaved. 11. 784. Fields, &c. Ann. 4, 5.
16. *V. triphyllus*, fingered. 1. 26. Sandy fields, rare. Ann. 4.
17. *V. verna*, vernal. 1. 25. Barren fields. Ann. 4.

#### PINGUICULA. Butterwort.

1. *P. lusitanica*, pale. 3. 145. Bogs, rare. Per. 6, 7.
2. *P. vulgaris*, common. 1. 70. Bogs. Per. 5, 6.
3. *P. grandiflora*, large-flowered. 31. 2184. Bogs, Ireland. Per. 5, 6.

#### UTRICULARIA. Bladder-wort.

1. *U. vulgaris*, common. 4. 253. Ditches and pools. Per. 7.
2. *U. intermedia*, intermediate. 35. 2489. Lakes, Irel. Per. 7.
3. *U. minor*, lesser. 4. 254. Bogs and ditches. Per. 7.

#### LENNA. Duck-weed.

1. *L. trifolca*, ivy-leaved. 13. 926. Pools and ditches. Ann. 6.

2. L.

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2. *L. minor*, lesser. 16. 1095. Pools, common. Ann. 6, 7.
  3. *L. gibba*, gibbous. 18. 1233. Pools. Ann. 6, 7.
  4. *L. polyrrhiza*, greater. 35. 2458. Ditches. Ann. 7, 8?
- Flowers of this species only have never been observed.

### LYCOPUS. Water-horehound.

1. *L. europæus*, common. 16. 1105. Ditches. Per. 7, 8.

### SALVIA. Clary.

1. *S. pratensis*, meadow. 3. 153. Dry meadows, rare. Per. 7.
2. *S. verbenaca*, common English. 3. 154. Pastures. Per. 6—10.

### Ord. 2. *Digynia*.

### ANTHOXANTHUM. Vernal-grafs.

1. *A. odoratum*, sweet-scented. 9. 647. Pastures. Per. 5.

### Class 3. TRIANDRIA.

#### Ord. 1. *Monogynia*.

### VALERIANA. Valerian.

1. *V. rubra*, red. 22. 1531. Walls, and chalk cliffs. Per. 6—9.
2. *V. dioica*, small marsh. 9. 628. Marshes. Per. 6.
3. *V. officinalis*, great wild. 10. 698. Marshes and hills. Per. 6.
4. *V. pyrenaica*, heart-leaved. 23. 1591. Woods, Scotland. Per. 6.
5. *V. Locusta*, corn-fallad. 12. 811. Fields, common. Ann. 4.
6. *V. dentata*, oval-fruited. 20. 1370. Fields, rare. Ann. 6, 7.

### CROCUS. Saffron.

- \*1. *C. sativus*, cultivated. 5. 343. Fields. Per. 9.
2. *C. vernus*, spring. 5. 344. Meadows and pastures. Per. 3.
3. *C. nudiflorus*, naked-flowering. 7. 491. Sandy low meadows. Per. 10.

### IXIA. Ixia.

1. *I. Bulbocodium*, Dwarf. 36. 2549. Hillocks, Jersey. Per. 4.

### IRIS. Iris.

1. *I. Pseud-acorus*, yellow. 9. 578. Waters. Per. 7.
2. *I. fetidissima*, stinking. 9. 596. Groves. Per. 6.

### SCHOENUS. Bog-rush.

1. *S. Mariscus*, prickly. 14. 950. Bogs and marshes. Per. 7, 8.
2. *S. nigricans*, black. 16. 1121. Spongy turf bogs. Per. 6.
3. *S. compressus*, compressed. 11. 791. Spongy meadows. Per. 7.
4. *S. rufus*, red-brown. 15. 1010. Marshes. Per. 7.
5. *S. albus*, white-headed. 14. 985. Spongy bogs. Per. 8.

Stamens but two. Seeds with many bristles at the base.

6. *S. fuscus*, brown-headed. 22. 1575. Bogs, South Wales. Per. 8.

Stamens three. Seeds with only three bristles at the base.

### CYPERUS. English Galangale.

1. *C. longus*, sweet-scented. n. 19. 1309. Marshes, rare. Per. 7.

### SCIRPUS. Club-rush.

1. *S. palustris*, marsh creeping. 2. 131. Bogs and ditches. Per. 6, 7.
2. *S. multicaulis*, many-stalked. 17. 1187. Turfy bogs. Per. 7.
3. *S. cæspitosus*, scaly-stalked. 15. 1029. Turfy heaths. Per. 7.
4. *S. pauciflorus*, chocolate-headed. 16. 1122. Mountain bogs. Per. 8.
5. *S. acicularis*, leaf. 11. 749. Moist heaths. Per. 8.
6. *S. fluitans*, floating. 3. 216. Ditches and pools. Per. 7, 8.
7. *S. lacustris*, bull-rush. 10. 666. Clear waters. Per. 7.
8. *S. glaucus*, glaucous. 33. 2321. Salt marshes. Per. 7, 8.
9. *S. Holoschoenus*, round cluster-headed. 23. 1612. Sea-shore. Per. 8—11.
10. *S. setaceus*, brittle-stalked. 24. 1693. Sandy wet places. Ann. 7, 8.
11. *S. triquetus*, triangular. 24. 1694. Marshes and rivers. Per. 8.
12. *S. carinatus*, blunt-edged. 28. 1983. Rivers. Per. 8.
13. *S. maritimus*, salt-marsh. 8. 542. Salt marshes. Per. 7, 8.
14. *S. sylvaticus*, wood, or millet. 13. 919. Moist woods. Per. 7.

### ERIOPHORUM. Cotton-grafs.

1. *E. vaginatum*, hare's-tail. 13. 873. Highland moors. Per. 3, 4.
2. *E. capitatum*, round-headed. 34. 2387. Highland mountains. Per. 8.
3. *E. polystachion*, broad-leaved. 8. 563. Bogs. Per. 4.
4. *E. angustifolium*, narrow-leaved. 8. 564. Bogs. Per. 4.
5. *E. gracile*, slender mountain. 34. 2402. Highland mountains. Per. 7.
6. *E. alpinum*, alpine. 5. 311. Highland bogs. Per. 4, 5.

### NARDUS. Mat-grafs.

1. *N. stricta*, common. 5. 290. Sandy moist heaths. Per. 7.

### Ord. 2. *Digynia*.

### PHALARIS. Canary-grafs.

- \*1. *P. canariensis*, manured. 19. 1310. Waste ground. Ann. 6—8.
2. *P. arundinacea*, reed. 6. 402. 30. 2160. f. 2. Ditches, &c. Per. 7.

### PANICUM. Panick-grafs.

1. *P. verticillatum*, rough. 13. 874. Moist fields. Ann. 6, 7.
2. *P. viride*, green. 13. 875. Sandy fields. Ann. 7.
3. *P. Crus-galli*, loose. 13. 876. Moist fields. Ann. 7.
4. *P. sanguinale*, cock's-foot. 12. 849. Fields, rare. Ann. 7.
5. *P. dactylon*, creeping. 12. 850. Sandy sea-shore. Per. 7, 8.

### PHLEUM. Cat's-tail-grafs.

1. *P. pratense*, common. 15. 1076. Pastures. Per. 6—10.
2. *P.*

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2. *P. alpinum*, alpine. 8. 519. Highlands. Per. 7.
3. *P. paniculatum*, paniced. 15. 1077. Fields, rare. Ann. 7.
4. *P. Boehmeri*, canary. 7. 459. Sand or chalk. Per. 7.
5. *P. Micheli*, Michelian. 32. 2265. Highland rocks. Per. 7.
6. *P. arenarium*, fea. 4. 222. Sandy fields. Ann. 6.

### ALOPECURUS. Fox-tail-grafs.

1. *A. pratensis*, meadow. 11. 759. Pastures and meadows. Per. 5.
2. *A. alpinus*, alpine. 16. 1126. Highlands. Per. 7. "Stem erect, smooth. Spike ovate. Glumes of the calyx downy, without awns, and nearly as long as the awns of the corolla."—Found by the late Mr. G. Don on mountains about Loch Nagore, Aberdeenshire. Stem a foot high. Spike white and downy, scarcely an inch long.
3. *A. agrestis*, slender. 12. 848. Cornfields, and way sides. Ann. 7.
4. *A. bulbosus*, bulbous. 18. 1249. Salt marshes. Per. 7.
5. *A. geniculatus*, floating. 18. 1250. Ponds and ditches. Per. 7.
6. *A. fulvus*, orange-spiked. 21. 1467. Ponds. Per. 7. "Stem ascending, bent at the joints. Spike compound, cylindrical. Glumes obtuse, hairy. Awn the length of the calyx. Anthers roundish."—Larger than the last. Anthers orange-coloured, opening at each side by an oval orifice.

### KNAPPIA. Knappia.

1. *K. agrostidea*, early. 16. 1127. Sandy places, rare. Ann. 3, 4.

### POLYPOGON. Beard-grafs.

1. *P. monspeliensis*, long-awned. 24. 1704. Salt marshes. Ann. 7, 8.
2. *P. littoralis*, short-awned. 18. 1251. Muddy salt marshes. Per. 8.

### MILIUM. Millet-grafs.

1. *M. effusum*, spreading. 16. 1106. Moist woods. Per. 6, 7.
2. *M. ligidigerum*, close, or panick. 16. 1107. Low fields. Ann. 8.

### AGROSTIS. Bent-grafs.

1. *A. Spica venti*, silky. 14. 951. Moist sandy fields. Ann. 6, 7.
2. *A. canina*, brown. 26. 1856. Moist pastures. Per. 7.
3. *A. fetacea*, bristly. 17. 1188. Dry heaths. Per. 7, 8.
4. *A. vulgaris*, fine. 24. 1671. Pastures and heaths. Per. 7.
5. *A. stolonifera*, creeping. 22. 1532. Moist fields. Per. 7, 8.
6. *A. alba*, marsh. 17. 1189. Bogs and woods. Per. 7.

### AIRA. Hair-grafs.

1. *A. cristata*, crested. 9. 648. Dry pastures. Per. 7, 8.
  2. *A. aquatica*, water. 22. 1557. Ponds, &c. Per. 5, 6.
  3. *A. cæspitosa*, turfy. 21. 1453. Moist ground. Per. 6, 7.
  4. *A. lævigata*, smooth-sheathed. 30. 2102. Highlands, and sea-coast. Per. 5, 6.
- "Leaves flat; with very smooth sheaths. Panicle close. Petals awned, hairy at the base. Partial stalk smooth and very short."—Native of Lapland as well as Scotland. Generally viviparous. Not half so tall as the last.
5. *A. flexuosa*, wavy. 22. 1519. Sandy heaths. Per. 7.

6. *A. canescens*, grey. 17. 1190. Sandy shores. Per. 7.
7. *A. præcox*, early. 18. 1296. Dry gravelly places. Ann. 5, 6.
8. *A. caryophyllæa*, silver. 12. 812. Barren heaths. Ann. 7.

### HOLCUS. Soft-grafs.

1. *H. lanatus*, meadow. 17. 1169. Meadows and pastures. Per. 6, 7.
2. *H. mollis*, creeping. 17. 1170. Fields and woods. Per. 7, 8.
3. *H. avenaceus*, oat-like. 12. 813. Waste ground. Per. 6, 7.

### MELICA. Melic-grafs.

1. *M. uniflora*, wood. 15. 1058. Groves. Per. 5, 6.
2. *M. nutans*, mountain. 15. 1059. Mountain woods. Per. 6, 7.
3. *M. cærulea*, purple. 11. 750. Wet sandy ground. Per. 8.

### SESLERIA. Moor-grafs.

1. *S. cærulea*, blue. 23. 1613. Limestone rocks. Per. 4.

### POA. Meadow-grafs.

1. *P. aquatica*, reed. 19. 1315. Ditches and rivers. Per. 7.
2. *P. fluitans*, flote. 22. 1520. Ponds and ditches. Per. 6—8.
3. *P. difflans*, reflexed. 14. 986. Waste ground. Per. 7.
4. *P. maritima*, creeping fea. 16. 1140. Salt marshes. Per. 7.
5. *P. procumbens*, procumbent fea. 8. 532. Near the fea. Ann. 7, 8.
6. *P. rigida*, hard. 20. 1371. Walls. Ann. 6.
7. *P. compressa*, flat-stalked. 6. 365. Walls, &c. Per. 7, 8.
8. *P. alpina*, alpine. 14. 1003. Highlands. Per. 7.
9. *P. flexuosa*, zig-zag. 16. 1123. Highlands. Per. 7.
10. *P. bulbosa*, bulbous. 15. 1071. Sea-coast. Per. 5, 6.
11. *P. cæsia*, fea-green. 24. 1719. Highlands. Per. 6, 7.
12. *P. trivialis*, roughish. 15. 1072. Meadows and pastures. Per. 6—9.
13. *P. pratensis*, smooth-stalked. 15. 1073. Mead. and past. Per. 5, 6.
14. *P. humilis*, short blueish. 14. 1004. Mountain pastures. Per. 6.
15. *P. annua*, annual. 16. 1141. Cultivated ground. Ann. 3—11.
16. *P. glauca*, slender glaucous. 24. 1720. Mountains. Per. 6, 7.
17. *P. nemoralis*, wood. 18. 1265. Woods. Per. 6.
18. *P. decumbens*, decumbent. 11. 792. Barren bogs. Per. 7.

### BRIZA. Quaking-grafs.

1. *B. minor*, small. 19. 1316. Fields, rare. Ann. 7.
2. *B. media*, common. 5. 340. Pastures. Per. 5, 6.

### DACTYLIS. Cock's-foot-grafs.

1. *D. striata*, smooth. 6. 380. Muddy sea shore. Per. 8.
2. *D. glomerata*, rough. 5. 335. Meadows and pastures. Per. 6—8.

### CYNOSURUS. Dog's-tail-grafs.

1. *C. cristatus*, crested. 5. 316. Pastures. Per. 7.
2. *C. echinatus*, rough. 19. 1333. Sandy ground. Ann. 7.

FESTUCA.

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## FESTUCA. Fescue-grafs.

1. *F. ovina*, sheep's. 9. 585. Open pastures. Per. 6.
  2. *F. vivipara*, viviparous. 19. 1355. Mountains. Per. 7.
  3. *F. cæsia*, sea-green heath. 27. 1917. Dry heaths. Per. 6.
- “Panicle pointing one way, clofe, glaucous. Florets cylindrical, roughifh, awned; inner glume rough-edged. Stem quadrangular. Leaves compressed, channelled, glaucous.”—About Bury, Suffolk, forming broad, depressed, very glaucous tufts. *Stems* a span high.
4. *F. duriuscula*, hard. 7. 470. Meadows and pastures. Per. 6.
  5. *F. rubra*, creeping. 29. 2056. Mountains and sea shore. Per. 7.
  6. *F. bromoides*, barren. 20. 1411. Walls and fand. Ann. 6.
  7. *F. myurus*, wall. 20. 1412. Walls and fand. Ann. 6.
  8. *F. uniglumis*, fingle-husked. 20. 1430. Sea fand. Ann. 6.
  9. *F. triflora*, three-flowered. 27. 1918. Pastures. Per. 7.
- “Panicle spreading. Spikelets three-flowered, with long awns.”—Like the following, but lefs drooping, and with fewer florets.
10. *F. gigantea*, tall. 26. 1820. Woods and hedges. Per. 7, 8.
  11. *F. calamaria*, reed-like. 14. 1005. Mountain woods. Per. 7.
  12. *F. decidua*, deciduous. 32. 2266. Mountain woods. Per. 8.
- “Panicle pointing one way, erect, much branched. Florets two or three, oblong, angular, beardless; the upper ones deciduous. Leaves linear, striated.”—Lower and much more slender than the last. The lowermost *floret* only ripens feed.
13. *F. loliacca*, spiked. 26. 1821. Moist pastures. Per. 6, 7.
  14. *F. pratensis*, meadow. 23. 1592. Meadows and past. Per. 6, 7.
  15. *F. elatior*, tall. 23. 1593. Moist meadows. Per. 6, 7.

## BROMUS. Brome-grafs.

1. *B. secalinus*, smooth rye. 17. 1171. Corn-fields. Ann. 7.
  2. *B. multiflorus*, downy rye. 27. 1884. Corn-fields. Ann. 7.
  3. *B. mollis*, soft. 15. 1078. Pastures, &c. Bienn. 6.
  4. *B. racemosus*, smooth. 15. 1079. Past. and meadows. Ann. 6.
- †5. *B. squarrosus*, corn. 27. 1885. Corn-fields. Ann. 7.
6. *B. arvensis*, taper field. 28. 1984. Fields. Ann. 7.
  7. *B. pratensis*, tumid field. 13. 920 (arvensis). Fields. Ann. 6.
- “Panicle spreading, compound. Spikelets ovate, turgid, eight or ten-flowered. Florets elliptical, broad, imbricated, smoothifh, with three equidistant ribs at each side.”—Two feet high. *Panicle* smaller and more erect than in the last, but the *spikelets* are larger, more tumid, and greener. The true *arvensis* has only two close ribs on each side the keel of the *glume*.
8. *B. erectus*, upright perennial. 7. 471. Chalky past. Per. 7.
  9. *B. asper*, hairy wood. 17. 1172. Moist woods. Ann. Biennial. 7.
  10. *B. sterilis*, barren. 15. 1030. Waste ground, and fields. Ann. 6, 7.

11. *B. diandrus*, upright annual. 14. 1006. Walls and fand. Ann. 6.
12. *B. sylvaticus*, slender wood. 11. 729. Thickets and hedges. Per. 7.
13. *B. pinnatus*, spiked heath. 11. 730. Chalky heaths. Per. 7.

## STIPA. Feather-grafs.

- †1. *S. pennata*, plummy. 19. 1356. Rocks. Per. 7.

## AVENA. Oat-grafs.

1. *A. fatua*, wild haver. 31. 2221. Fields. Ann. 8.
  2. *A. strigosa*, bristle-pointed oat. 18. 1266. Corn-fields. Ann. 7.
- This is now admitted as a native species, in consequence of its having been found in Scotland, Wales, Yorkshire, and Cornwall, notwithstanding the contrary opinion expressed in Fl. Brit. 140. See AVENA, n. 22.
3. *A. pubescens*, downy. 23. 1640. Chalky pastures. Per. 6.
  4. *A. pratensis*, narrow leaved. 17. 1204. Limestone soil. Per. 7.
  5. *A. planiculmis*, flat-strawed. 30. 2141. Highland mountains. Per. 7.
- “Panicle erect. Calyx containing about five florets. Receptacles bearded upwards. Leaves naked, finely serrated, with rough sheaths. Stem compressed.”—Like *A. pubescens* in general aspect, but larger in every part, and the leaves are naked, not downy; their edges finely serrated, as in *pratensis*. *Flowers* much larger than in either of those.
6. *A. flavescens*, yellow. 14. 952. Pastures and waste ground. Per. 6, 7.

## LAGURUS. Hare's-tail-grafs.

1. *L. ovatus*, ovate. 19. 1334. Sands in Guernsey. Ann. 6.

## ARUNDO. Reed.

1. *A. Phragmites*, common. 6. 401. Fens and ditches. Per. 7.
  2. *A. epigejos*, wood. 6. 402. Moist woods. Per. 7.
  3. *A. Calamagrostis*, small. 30. 2159. Moist woods and fens. Per. 7.
  4. *A. striata*, smallest clofe. 30. 2160. Marshes, Scotland. Per. 6.
- “Calyx fingle-flowered, full as long as the corolla. *Panicle* erect, clofe. *Flowers* scattered, erect, with a dorsal awn. Down shorter than the corolla.”—Half the size of the last. *Calyx* acute, but without elongated points. *Stipula* very short. The *panicle* is of a purplish bronze hue, not unlike *Melica cerulea*.
5. *A. arenaria*, sea. 8. 520. Sandy sea-coast. Per. 7.

## LOLIUM. Darnel.

1. *L. perenne*, perennial. 5. 315. Meadows and pastures. Per. 6.
2. *L. temulentum*, bearded. 16. 1124. Fields. Ann. 7.
3. *L. arvense*, white. 16. 1125. Fields, rare. Ann. 7.

## ROTBOLLIA. Hard-grafs.

1. *R. incurvato*, sea. 11. 760. Salt marshes. Ann. 8.

## ELYMUS. Lyme-grafs.

1. *E. arenarius*, upright sea. 24. 1672. Sandy sea-coast. Per. 7.

2. *E.*

PLANTS.

2. *E. geniculatus*, pendulous fea. 23. 1586. Muddy fea-coaft. Per. 7.  
 3. *E. europeus*, wood. 19. 1317. Chalky woods. Per. 6.

HORDEUM. Barley.

1. *H. murinum*, wall, or moufe. 28. 1971. Way fides. Ann. 6—8.  
 2. *H. pratense*, meadow. 6. 409. Moift pastures. Per. 6.  
 3. *H. maritimum*, fea. 17. 1205. Salt marfhes. Ann. 6, 7.

TRITICUM. Wheat-grafs.

1. *T. junceum*, rufhy. 12. 814. Sandy coafts. Per. 7.  
 2. *T. repens*, creeping, or couch. 13. 909. Waste ground. Per. 6—9.  
 3. *T. caninum*, bearded. 20. 1372. Chalky woods. Per. 7.  
 4. *T. cristatum*, crested. 32. 2267. Sea cliffs, Scotland. Per. 7?  
*Bromus cristatus* of Linnæus; fee BROMUS, n. 32.  
 5. *T. loliaceum*, dwarf fea. 4. 221. Sea fand. Ann. 6, 7.

Ord. 3. Trigynia.

MONTIA. Blinks.

1. *M. fontana*, water. 17. 1206. Rills and fprings. Ann. 4, 5.

HOLOSTEUM. Jagged-chickweed.

1. *H. umbellatum*, umbelliferous. 1. 27. Old walls. Ann. 4.

POLYCARPON. All-feed.

1. *P. tetraphyllum*, four-leaved. 15. 1031. Sandy fouth coaft. Ann. 5—8.

Clafs 4. TETRANDRIA.

Ord. 1. Monogynia.

DIPSACUS. Teafel.

- \*1. *D. fullonum*, manured. 29. 2080. Hedges. Bienn. 7.  
 2. *D. sylvestris*, wild. 15. 1032. Moift hedges. Bienn. 7.  
 3. *D. pilofus*, fmall. 13. 877. Moift chalks. Per. 8.

SCABIOSA. Scabious.

1. *S. succisa*, devil's bit. 13. 878. Pastures. Per. 8—10.  
 2. *S. arvensis*, field. 10. 659. Corn-fields. Per. 7.  
 3. *S. columbaria*, fmall. 19. 1311. Gravel or chalk. Per. 6, 7.

SHERARDIA. Field-madder.

1. *S. arvensis*, blue. 13. 891. Corn-fields. Ann. 5—8.

ASPERULA. Wood-ruff.

1. *A. odorata*, fweet. 11. 755. Woods. Per. 5.  
 2. *A. cynanchica*, fmall. 1. 33. Chalky hills. Per. 6.

GALIAM. Bed-ftraw.

1. *G. cruciatum*, cros-leaved. 2. 143. Thickets and hedges. Per. 5.  
 2. *G. palustre*, white water. 26. 1857. Moift meadows. Per. 7.  
 3. *G. Witheringii*, rough heath. 31. 2206. Moift hills. Per. 7.

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4. *G. faxatile*, fmoother heath. 12. 815. Heaths and dry hills. Per. 7, 8.  
 5. *G. uliginofum*, rough marfh. 28. 1972. Ditches. Per. 8.  
 6. *G. erectum*, upright. 29. 2067. Moift pastures. Per. 6, 7.  
 7. *G. verrucosum*, warty-fruited. 31. 2173. Corn-fields. Ann. 6—8.

This is the *Valantia Aparine* of Linnæus, whose feeds, be- fet with large tubercles, are compared by Tournefort and Vaillant to coriander comfits.

8. *G. tricornis*, three-flowered. 23. 1641. Corn-fields. Ann. 7.  
 9. *G. spurium*, fmoother-seeded corn. 26. 1871. Corn- fields, rare. Ann. 6, 7.  
 10. *G. pufillum*, leaf mountain. 2. 74. Limestone hills. Per. 7, 8.  
 11. *G. verum*, yellow. 10. 660. Fields and hills. Per. 7, 8.  
 12. *G. Mollugo*, great hedge. 24. 1673. Hedges. Per. 7, 8.  
 13. *G. anglicum*, wall. 6. 384. Old walls. Ann. 6, 7.  
 14. *G. borzale*, cros-leaved. 2. 105. Rocky hills. Per. 7.  
 15. *G. Aparine*, goofe-grafs. 12. 816. Hedges, common. Ann. 5—8.

RUBIA. Madder.

1. *R. peregrina*, wild. 12. 851. Rocks in the fouth. Per. 6, 7.

EXACUM. Gentianella.

1. *E. filiforme*, leaf. 4. 235. Sandy marfhes. Ann. 7.

PLANTAGO. Plantain.

1. *P. major*, greater. 22. 1558. Pastures and cultivated ground. Per. 5—9.  
 2. *P. media*, hoary. 22. 1559. Chalky hills. Per. 5—8.  
 3. *P. lanceolata*, rib-wort. 8. 507. Meadows and pa- stures. Per. 6, 7.  
 4. *P. maritima*, fea. 3. 175. Sea-coaft and lofty moun- tains. Per. 8.  
 5. *P. Coronopus*, buck's-horn. 13. 892. Sandy pastures. Ann. 5—8.

CENTUNCULUS. Chaff-weed.

1. *C. minimus*, fmall. 8. 531. Inundated heaths. Ann. 6, 7.

SANGUISORBA. Burnet.

1. *S. officinalis*, great. 19. 1312. Meadows and pastures. Per. 6.

EPIMEDIUM. Barren-wort.

1. *E. alpinum*, alpine. 7. 438. Mountain thicket, rare. Per. 5.

CORNUS. Cornel.

1. *C. fanguinea*, wild. 4. 249. Hedges. Shrub. 6.  
 2. *C. Suecica*, dwarf. 5. 310. Alpine meadows. Per. 6, 7.

PARIETARIA. Pellitory.

1. *P. officinalis*, wall. 13. 879. Old walls. Per. 6—9.

ALCHEMILLA. Ladies'-mantle.

1. *A. vulgaris*, common. 9. 597. Meadows and pa- stures. Per. 6, 7.  
 2. *A. alpina*, alpine. 4. 244. Micaceous rocks. Per. 7.

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3. A.

PLANTS.

3. *A. arvensis*, field. 15. 1011. Fallow fields. Ann. 5—8.  
 Ord. 2. *Digynia*.  
 BUFFONIA. *Buffonia*.  
 †1. *B. tenuifolia*, slender. 19. 1313. Sea-coast? Ann. 6.  
 Ord. 3. *Tetragynia*.  
 ILEX. *Holly*.

1. *I. Aquifolium*, common. 7. 496. Woods and hedges.  
 Tree. 5.

POTAMOGETON. Pond-weed.

1. *P. natans*, broad-leaved. 26. 1822. Ponds and rivers.  
 Per. 7.  
 2. *P. heterophyllum*, various-leaved. 18. 1285. Ditches  
 and pools. Per. 7—9.  
 3. *P. perfoliatum*, perfoliate. 3. 168. Rivers and pools.  
 Per. 7, 8.  
 4. *P. densum*, close-leaved. 6. 297. Pools and slow  
 streams. Per. 6.  
 5. *P. fluitans*, long-leaved floating. 18. 1286. Ditches and  
 rivulets. Per. 8, 9.  
 6. *P. lucens*, shining. 6. 376. Rivers, pools and lakes.  
 Per. 6, 7.  
 7. *P. lanceolatum*, lanceolate. 28. 1985. Lakes, Wales.  
 Per. 8.  
 8. *P. crispum*, curled. 15. 1012. Pools and rivers.  
 Per. 6, 7.  
 9. *P. compressum*, flat-stalked. 6. 418. Rivers and ditches.  
 Per. 6, 7.  
 10. *P. gramineum*, grassy. 32. 2253. Rivers and ditches.  
 Per. 7.  
 11. *P. pufillum*, small. 3. 215. Clay-pits. Per. 7.  
 12. *P. pedunculatum*, fennel-leaved. 5. 323. Rivers and marine  
 ditches. Per. 7.

RUPPIA. Ruppia.

1. *R. maritima*, sea. 2. 136. Salt-water ditches.  
 Per? 7.

SAGINA. Pearl-wort.

1. *S. procumbens*, procumbent. 13. 880. Sandy wastes.  
 Per. 5—8.  
 2. *S. maritima*, sea. 31. 2195. Sea-coast, and moun-  
 tains. Ann. 5—8.  
 3. *S. apetalá*, small-flowered. 13. 881. Sandy wastes.  
 Ann. 5, 6.  
 4. *S. erecta*, upright. 9. 609. Gravelly pastures.  
 Ann. 5.

TILLÆA. Tillæa.

1. *T. muscous*, mossy. 2. 116. Sandy heaths. Ann. 5, 6.

RADIOLA. Flax-feed.

1. *R. millegrana*, thyme-leaved. 13. 893. Wet sand.  
 Ann. 7, 8.

Class 5. PENTANDRIA.

Ord. 1. *Monogynia*.

MYOSOTIS. Scorpion-grass.

1. *M. arvensis*, field. 36. 2558. Dry fields. Ann. 6.  
 "Seeds smooth. Leaves oblong Branches spreading.

Clusters many-flowered, without bractæas; their lower stalks axillary and remote. Calyx ovate, with spreading incurved bristles."—See MYOSOTIS, n. 1; where the author, Mr. Drake, has mentioned two varieties. The  $\beta$  is our following species, *versicolor*; the  $\gamma$  is also probably distinct, but has not yet been published as such in Engl. Bot.

2. *M. versicolor*, yellow and blue. 7. 480. f. 1. Barren fields. Ann. 6.

"Seeds smooth. Leaves oblong. Branches ascending. Clusters many-flowered, on long naked stalks, without bractæas. Calyx ovate, with spreading incurved bristles."—Found sometimes also in boggy meadows. The flowers are yellow when they first open.

3. *M. palustris*, water. 28. 1973. Ditches and pools.  
 Per. 7, 8.

4. *M. rupicola*, rock. 36. 2559. Highland rocks. Per. 7.  
 "Seeds smooth. Leaves oblong; the radical ones on long footstalks. Clusters many-flowered, without bractæas. Calyx divided above half way down, its hairs copious, spreading and elongated."—Most like the last; with still larger blue flowers.

LITHOSFERMUM. Gromwell.

1. *L. officinale*, common. 2. 134. Chalky hills. Per. 5.  
 2. *L. arvense*, corn. 2. 123. Fields. Ann. 5, 6.  
 3. *L. purpureo-ceruleum*, creeping. 2. 117. Chalky thickets, rare. Per. 5.

ANCHUSA. Alkanet.

1. *A. officinalis*, common. 11. 662. Rubbish by the sea. Per. 6, 7.  
 2. *A. sempervirens*, evergreen. 1. 45. Waste ground. rare. Per. 5, 6.

CYNOGLOSSUM. Hound's-tongue.

1. *C. officinale*, common. 13. 921. Waste ground.  
 Bienn. 6.  
 2. *C. sylvaticum*, green-leaved. 23. 1642. Shady hedges.  
 Bienn. 6.

PULMONARIA. Lung-wort.

1. *P. officinalis*, common. 2. 118. Groves, rare. Per. 5.  
 2. *P. angustifolia*, narrow-leaved. 23. 1628. Groves, rare. Per. 5.  
 3. *P. maritima*, sea. 6. 368. Sandy shores. Per. 7.

SYMPHYTUM. Comfrey.

1. *S. officinale*, common. 12. 817. Watery places.  
 Per. 5, 6.  
 2. *S. tuberosum*, tuberous-rooted. 21. 1502. Moist groves. Per. 7.

BORAGO. Borage.

- \*1. *B. officinalis*, common. 1. 36. Waste ground.  
 Bienn. 6, 7.

ASPERUGO. Madwort.

1. *A. procumbens*, procumbent. 10. 661. Waste ground, rare. Ann. 5.

LYCOPSIS. Buglofs.

1. *L. arvensis*, small. 14. 938. Fields and hedges.  
 Ann. 6, 7.

ECHINUM.

## PLANTS.

### ECHIUM. Viper's-buglofs.

1. *E. italicum*, white. 29. 2081. Sandy fields, rare. Bienn. 7.
2. *E. vulgare*, common blue. 3. 181. Fields and walls. Bienn. 6, 7.

### PRIMULA. Primrose.

1. *P. vulgaris*, common. 1. 4. Groves and banks. Per. 4.
2. *P. elatior*, ox-lip. 8. 513. Groves, rare. Per. 4.
3. *P. veris*, cowslip. 1. 5. Meadows and pastures. Per. 4, 5.
4. *P. farinosa*, bird's-eye. 1. 6. Mountain bogs. Per. 6, 7.

### CYCLAMEN. Cyclamen.

- \*1. *C. europæum*, spring. 8. 548. Groves, rare. Per. 4.

### MENYANTHES. Buck-bean.

1. *M. trifoliata*, common. 7. 495. Wet meadows. Per. 6, 7.
2. *M. nymphæoides*, fringed. 4. 217. Rivers. Per. 8.

### HOTTONIA. Water-violet.

1. *H. palustris*, common. 6. 364. Pools and ditches. Per. 6, 7.

### LYSIMACHIA. Loofsestrife.

1. *L. vulgaris*, yellow. 11. 761. Watery thickets. Per. 7.
2. *L. thyrsoflora*, tufted. 3. 176. Bogs, rare. Per. 7.
3. *L. nemorum*, wood. 8. 527. Groves. Per. 5—9.
4. *L. Nummularia*, creeping. 8. 528. Shady rills. Per. 6, 7.

### ANAGALLIS. Pimpernel.

1. *A. arvensis*, scarlet. 8. 529. Fields and gardens. Ann. 6, 7.
2. *A. carulea*, blue. 26. 1823. Fields, rare. Ann. 6, 7.
3. *A. tenella*, bog. 8. 530. Bogs and springs. Per. 7, 8.

### AZALEA. Azalea.

1. *A. procumbens*, trailing. 13. 865. Alpine heaths. Small shrub. 7.

### CONVOLVULUS. Bind-weed.

1. *C. arvensis*, small. 5. 312. Gravelly pastures. Per. 6, 7.
2. *C. sepium*, great. 5. 313. Moist hedges. Per. 7, 8.
3. *C. Soldanella*, sea. 5. 314. Sandy sea-coast. Per. 7.

### POLEMONIUM. Jacob's-ladder.

1. *P. caruleum*, blue. 1. 14. Mountain thickets, rare. Per. 6.

### CAMPANULA. Bell-flower.

1. *C. rotundifolia*, round-leaved. 13. 866. Heaths and banks. Per. 8, 9.
2. *C. patula*, spreading. 1. 42. Pastures, rare. Bienn. 7, 8.
3. *C. Rapunculus*, rampion. 4. 283. Banks. Bienn. 7, 8.
4. *C. latifolia*, giant. 5. 302. Woods and shady rocks. Per. 8.
5. *C. rapunculoides*, creeping. 20. 1369. Woods, rare. Per. 8.

6. *C. Trachelium*, nettle-leaved. 1. 12. Groves and hedges. Per. 7.
7. *C. glomerata*, clustered. 2. 90. Chalky hills. Per. 7, 8.
8. *C. hybrida*, corn. 6. 375. Chalky fields. Ann. 8.
9. *C.hederacea*, ivy-leaved. 2. 73. Shady rills, rare. Per. 6—8.

### PHYTEUMA. Rampion.

1. *P. orbiculare*, round-headed. 2. 142. Chalky hills, rare. Per. 8.

### JASIONE. Sheep's-bit.

1. *J. montana*, scabious. 13. 882. Sandy pastures. Ann. 6, 7.

### LOBELIA. Lobelia.

1. *L. Dortmanna*, water. 2. 140. Lakes, rare. Per. 7.
2. *L. urens*, acrid. 14. 953. Moist heaths, rare. Per. 8, 9.

### IMPATIENS. Balfam.

1. *I. Noli-me-tangere*, yellow. 14. 937. Shady springs, rare. Ann. 8.

### VIOLA. Violet.

1. *V. hirta*, hairy. 13. 894. Limestone woods. Per. 4.
2. *V. odorata*, sweet. 9. 619. Groves and banks. Per. 3, 4.
3. *V. palyfris*, marfh. 7. 444. Mossy bogs. Per. 4.
4. *V. canina*, dog's. 9. 620. Groves and heaths. Per. 4—6.
5. *V. lactea*, cream-coloured. 7. 445. Mountainous heaths. Per. 5.
6. *V. tricolor*, common pansy. 18. 1287. Fields. Ann. 5—9.
7. *V. lutea*, yellow mountain. 11. 721. Mountain bogs. Per. 5—9.

### VERBASCUM. Mullein.

1. *V. Thapsus*, great. 8. 549. Hedges and way sides. Bienn. 7, 8.
2. *V. Lychnitis*, white. 1. 58. Chalky banks. Bienn. 7, 8.
3. *V. pulverulentum*, yellow hoary. 7. 487. Gravelly banks. Bienn. 7.
4. *V. nigrum*, dark, or black. 1. 59. Gravel or chalk. Per. 7, 8.
5. *V. virgatum*, large-flowered. 8. 550. Gravelly fields, rare. Bienn. 8.
6. *V. Blattaria*, moth. 6. 393. Gravelly fields. Ann. 7.

### DATURA. Thorn-apple.

- \*1. *D. Stramonium*, prickly. 18. 1288. Dunghills and wastes. Ann. 7.

### HYOSCYAMUS. Hen-bane.

1. *H. niger*, common. 9. 591. Waste ground. Ann. 7.

### ATROPA. Deadly-nightshade.

1. *A. Belladonna*, common, or dwale. 9. 592. Chalky hills. Per. 6.

### SOLANUM. Nightshade.

1. *S. Dulcamara*, woody. 8. 565. Hedges. Shrub. 6, 7.
2. *S. nigrum*, common, or garden. 8. 566. Cultivated ground. Ann. 6—9.

# PLANTS.

## CHIRONIA. Centaury.

1. *C. Centaurium*, common. 6. 417. Gravelly pastures. Ann. 7, 8.
  2. *C. litoralis*, dwarf tufted. 33. 2305. Sea-coast. Ann. 6.
- “Stems herbaceous, simple, straight. Leaves linear-obovate. Calyx-teeth awl-shaped. Flowers densely cymbose, nearly sessile.”—About two inches high. Flowers large and handsome. Distinct from the varieties of the foregoing mentioned under CHIRONIA, n. 11.
3. *C. pulchella*, dwarf branched. 7. 458. Sandy sea-coast. Ann. 8, 9.

## SAMOLUS. Brook-weed.

1. *S. Valerandi*, pimpernel. 10. 703. Marshes. Per. 7.

## LONICERA. Honeyfuckle.

1. *L. Caprifolium*, pale perfoliate. 12. 799. Groves and coppices. Shrub. 5, 6.
2. *L. Periclymenum*, common woodbine. 12. 800. Woods and hedges. Shrub. 6, 7.
3. *L. Xylosteum*, upright. 13. 916. Thickets, rare. Shrub. 7.

## RHAMNUS. Buckthorn.

1. *R. catharticus*, common. 23. 1629. Hedges. Shrub. 5, 6.
2. *R. Frangula*, alder-leaved. 4. 250. Woods and thickets. Shrub. 5.

## EUONYMUS. Spindle-tree.

1. *E. europæus*, common. 6. 362. Hedges and woods. Shrub. 5.

## RIBES. Currant.

1. *R. rubrum*, red. 18. 1289. Shady banks of northern rivers. Shrub. 5.
2. *R. alpinum*, tasteless mountain. 10. 704. Woods and thickets. Shrub. 4, 5.
3. *R. spicatum*, acid mountain. 18. 1290. Mountain woods. Shrub. 5.
4. *R. petraeum*, rock. 10. 705. Mountains. Shrub. 5.
5. *R. nigrum*, black. 18. 1291. Wet thickets. Shrub. 5.
- \*6. *R. Grossularia*, rough gooseberry. 18. 1292. Hedges. Shrub. 4.
- \*7. *R. Uva crispata*, smooth gooseberry. 29. 2057. Hedges. Shrub. 4.

## HEDERA. Ivy.

1. *H. Helix*, common. 18. 1267. Woods and walls. Shrub. 10.

## ILLICERUM. Knot-weed.

1. *I. verticillatum*, whorled. 13. 895. Sea marshes, Dev. and Corn. Per. 7.

## GLAUX. Salt-weed.

1. *G. maritima*, sea, or black. 1. 13. Muddy salt-marshes. Per. 6, 7.

## THESIUM. Bastard Toad-flax.

1. *T. linophyllum*, common. 4. 247. Chalky hills. Per. 7.

## VINCA. Periwinkle.

1. *V. minor*, lesser. 13. 917. Banks and groves. Per. 5.
2. *V. major*, greater. 8. 514. Woods and hedges. Per. 5.

## Ord. 2. Digynia.

### HERNIARIA. Rupture-wort.

1. *H. glabra*, smooth. 3. 206. Sand or gravel. Per. 7, 8.
2. *H. hirsuta*, hairy. 20. 1379. Sand, rare. Per. 7, 8.

### CHENOPodium. Goosefoot.

1. *C. Bonus Henricus*, perennial. 15. 1033. Waste ground. Per. 5, 6.
2. *C. urticum*, upright. 10. 717. Dunghills and banks. Ann. 8, 9.
3. *C. rubrum*, red. 24. 1721. Waste ground. Ann. 8.
4. *C. botryodes*, many-clustered. 32. 2247. Sea marshes. Ann. 8.

“Leaves triangular, somewhat toothed; the upper ones bluntish. Clusters upright, compound, rounded, leafy.” Leaves much smaller, and more fleshy, than in the last, of which it has long been taken for a maritime variety.

5. *C. murale*, nettle-leaved. 24. 1722. Walls and banks. Ann. 8, 9.
6. *C. hybridum*, maple-leaved. 27. 1919. Moist waste ground. Ann. 8.
7. *C. album*, white. 24. 1723. Fields and gardens, common. Ann. 7, 8.
8. *C. ficifolium*, fig-leaved. 24. 1724. Dunghills and fields. Ann. 8.
9. *C. glaucum*, oak-leaved. 21. 1454. Sandy fields. Ann. 8.
10. *C. olidum*, stinking. 15. 1034. Near the sea. Ann. 8.
11. *C. polyspermum*, round-leaved. 21. 1480. Dunghills, &c. Ann. 7, 8.
12. *C. acutifolium*, sharp entire-leaved. 21. 1481. Waste ground. Ann. 7, 8.

“Leaves ovate, acute, entire. Stem erect. Clusters somewhat cymose, elongated, leafless.”—Differs from the last, with which it has generally been confounded, in its erect, more angular stem, and sharp-pointed leaves. The clusters also are spiked rather than cymose.

### BETA. Beet.

1. *B. maritima*, sea. 4. 285. Muddy sea-shores. Per. 8.

### SALSOLA. Salt-wort.

1. *S. Kali*, prickly. 9. 634. Sandy beach. Ann. 7.
2. *S. fruticosus*, shrubby. 9. 635. Norfolk and southern coasts. Shrub. 7, 8.

### ULMUS. Elm.

1. *U. campestris*, common, or Norfolk. 27. 1886. Woods and hedges. Tree. 4.
2. *U. suberosa*, cork-barked, or Suffex. 31. 2161. Woods and hedges. Tree. 3.
3. *U. glabra*, smooth, or wych. 32. 2248. Hedges, Effex. Tree. 3.
4. *U. montana*, broad-leaved, or wych hazel. 27. 1887. Woods and hedges. Tree. 4.
- \*5. *U. major*, Dutch. 36. 2542. Hedges. Tree. 3.

### CUSCUTA. Dodder.

1. *C. europæa*, greater. 6. 378. On thistles and nettles. Ann. 8, 9.
2. *C. Epithymum*, lesser. 1. 55. On heath and thyme. Per? 8.

### SWERTIA.

PLANTS.

SWERTIA. Felwort.

- †1. *S. perennis*, marsh. 21. 1441. Alpine bogs. Per. 8.

GENTIANA. Gentian.

1. *G. Pneumonanthe*, marsh. 1. 20. Moist heaths. Per. 8, 9.
2. *G. aculis*, dwarf. 23. 1594. South Wales. Per. 5.
3. *G. verna*, spring. 7. 493. Barren mountains. Per. 4.
4. *G. nivalis*, small alpine. 13. 896. Highland rocks. Ann. 8.
5. *G. Amarella*, autumnal. 4. 236. Limestone pastures. Ann. 8.
6. *G. campestris*, field. 4. 237. Gravelly pastures. Ann. 9.

Umbelliferous plants.

ERYNGIUM. Eryngo.

1. *E. maritimum*, sea. 10. 718. Sandy beach. Per. 7, 8.
2. *E. campestre*, field. 1. 57. Waste ground, rare. Per. 7, 8.

HYDROCOTYLE. White-rot.

1. *H. vulgaris*, marsh. 11. 751. Watery ground. Per. 5, 6.
2. *H. inundata*, floating. 4. 227. Ditches and pools. Bienn? 5.

SANICULA. Sanicle.

1. *S. europæa*, wood. 2. 98. Groves. Per. 5.

BUPLEURUM. Hare's-car.

1. *B. rotundifolium*, round-leaved. 2. 99. Chalky fields. Ann. 7.
2. *B. odontites*, narrow-leaved. 35. 2468. Rocks, Devon. Ann. 7.
3. *B. tenuissimum*, slender. 7. 478. Muddy salt-marshes. Ann. 7, 8.

ECHINOPHORA. Prickly-Sampire.

- †1. *E. spinosa*, great. 34. 2413. Sandy sea-coast. Per. 7.

TORDYLIUM. Hart-wort.

- †1. *T. officinale*, smaller. 34. 2440. Fields, rare. Ann. 6, 7.
2. *T. maximum*, great. 17. 1173. Chalky ground, rare. Ann. 6, 7.

CAUCALIS. Bur-parsley.

1. *C. daucoides*, small. 3. 197. Chalky fields. Ann. 6.
2. *C. latifolia*, great. 3. 198. Chalky fields, rare. Ann. 7.
3. *C. Anthriscus*, upright. 14. 987. Hedges and banks. Ann. 7.
4. *C. infesta*, spreading. 19. 1314. Fields and hedges. Ann. 7.
5. *C. nodosa*, knotted. 3. 199. Gravelly banks. Ann. 5, 6.

DAUCUS. Carrot.

1. *D. Carota*, wild. 17. 1174. Borders of fields. Bienn. 6, 7.
2. *D. maritimus*, sea-coast. 36. 2560. Cornwall. Bienn. 7, 8.

"Fruit armed with compressed teeth. Leaflets dilated, succulent, hairy, with rounded segments. Umbels convex

when in seed."—About 18 inches high, woolly rather than hairy, of a more fleshy habit than the foregoing. The umbels want the remarkable dark-red central abortive flower, which is characteristic of *D. Carota*. The compressed teeth which clothe the seeds approach to the nature of *D. mauritanicus* and *muricatus*.

BUNIUM. Earth-nut.

1. *B. Bulbocastanum*, common. 14. 988. Pastures. Per. 5, 6.

The *B. Bulbocastanum* and *flexuosum* of Withering, and of Sm. Fl. Brit. 301, prove, on mature examination, to be, as Linnæus considered them, one and the same species. The root of the former, being near the surface, its stem has no elongated tapering base, and if the herb happens to be luxuriant, the leaves of the general involucre are more numerous than otherwise.

CONIUM. Hemlock.

1. *C. maculatum*, common. 17. 1191. Hedges. Bienn. 6, 7.

SELINUM. Milky-parsley.

1. *S. palustre*, marsh. 4. 229. Wet meadows. Per. 7.

ATHAMANTA. Stone-parsley.

1. *A. Libanotis*, mountain. 2. 138. Chalky pastures, rare. Per. 8.

PEUCEDANUM. Sulphur-wort

1. *P. officinale*, sea. 25. 1767. Salt marshes. Per. 6, 7.
2. *P. Silaus*, meadow. 30. 2142. Moist pastures. Per. 8.

CRITHMUM. Sampire.

1. *C. maritimum*, sea. 12. 819. Sea cliffs. Per. 8.

HERACLEUM. Cow-parsnep.

1. *H. Sphondylium*, common. 14. 939. Borders of fields. Bienn. 7.

*H. angustifolium*, Fl. Brit. 307, proves, on a careful examination, to be only a narrow-leaved variety of this, distinct from the true *angustifolium* of Linnæus.

LIGUSTICUM. Lovage.

1. *L. scoticum*, Scottish. 17. 1207. Scottish coast. Per. 7.
2. *L. cornubiense*, Cornish. 10. 683. Thickets, Cornwall. Per. 7.
3. *L. Meum*, spignel. 32. 2249. Mountain pastures. Per. 5.

ANGELICA. Angelica.

- \*1. *A. Archangelica*, garden. 36. 2561. Wet meadows, rare. Bienn. 9.
2. *A. sylvestris*, wild. 16. 1128. Watery places. Per. 7.

SIMUM. Water-parsnep.

1. *S. latifolium*, broad-leaved. 3. 204. Rivers and ditches. Per. 7, 8.
2. *S. angustifolium*, narrow-leaved. 2. 139. Rivers and ditches. Per. 7, 8.
3. *S. nodiflorum*, procumbent. 9. 639. Ditches and rivulets. Per. 7, 8.
4. *S. repens*, creeping. 20. 1431. Watery ground. Per. 6—8.
5. *S. verticillatum*, whorled. 6. 395. Salt meadows. Per. 7, 8.

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## SISON. Hone-wort.

1. *S. Amomum*, hedge. 14. 954. Moist chalk or marl. Ann. 8.
2. *S. Jegetum*, corn. 4. 228. Chalky fields, rare. Ann. 8.

## OENANTHE. Water-Dropwort.

1. *O. fffulosa*, common. 6. 363. Ditches and bogs. Per. 7, 8.
2. *O. pimpinelloides*, parsley. 5. 347. Salt marshes. Per. 7.
3. *O. peucedanifolia*, sulphur-wort. 5. 348. Ditches and bogs. Per. 6.
4. *O. crocata*, hemlock. 33. 2313. Watery places. Per. 7.

## CORIANDRUM. Coriander.

- \*1. *C. fativum*, common. 1. 67. Fields and dunghills, rare. Ann. 6.

## PIHELLANDRIUM. Water-Hemlock.

1. *P. aquaticum*, common. 10. 684. Ditches and rivers. Bienn. 6, 7.

## CICUTA. Cowbane.

1. *C. virofa*, water. 7. 479. Rivers and ditches. Per. 8.

## AETHUSA. Fool's-Parsley.

1. *A. Cynapium*, common. 17. 1192. Cultivated ground. Ann. 7, 8.

## SCANDIX. Chervil.

1. *S. odorata*, great or sweet. 10. 697. Mountain pastures. Per. 5.
2. *S. Peæden-Veneris*, needle. 20. 1397. Corn-fields. Ann. 6, 7.
- \*3. *S. Cerefolium*, garden. 18. 1268. Banks and hedges. Ann. 6.
4. *S. Anthriscus*, rough. 12. 818. Hedges and rubbish. Ann. 5.

## CILIOPHYLLUM. Cow-Parsley.

1. *C. sylvestre*, smooth-stalked. 11. 752. Hedges and thickets. Per. 4, 5.
2. *C. temulentum*, rough-stalked. 22. 1521. Hedges and groves. Bienn. 6, 7.
3. *C. aureum*, tawny-seeded. 30. 2103. Borders of fields, Scotland. Per. 6.

## IMPERATORIA. Master-wort.

1. *I. Ostruthium*, great. 20. 1380. Moist mountain pastures. Per. 6.

## PASTINACA. Parsnep.

1. *P. fativa*, wild. 8. 556. Chalky banks. Bienn. 7.

## SMYRNIUM. Alexanders.

1. *S. Olusatrum*, common. 4. 230. Ruins, and sea cliffs. Bienn. 5.

## ANETHUM. Fennel.

1. *A. Feniculum*, common. 17. 1208. Chalk cliffs. Bienn. 7, 8.

## CARUM. Caraway.

- \*1. *C. Carui*, common. 21. 1503. Meadows and pastures. Bienn. 6.

## PIMPINELLA. Burnet-Saxitrage.

1. *P. saxifraga*, common. 6. 407. Dry chalky pastures. Per. 7, 8.
2. *P. magna*, great. 6. 408. Limestone groves. Per. 7, 8.
3. *P. dioica*, dwarf. 17. 1209. Limestone rocks, rare. Per. 5, 6.

## APIUM. Celery.

1. *A. graveolens*, wild. 17. 1210. Ditches and marshes. Bienn. 8.

## AEGOPIDIUM. Gout-weed.

1. *A. Podagraria*, common. 14. 940. Shady cultivated ground. Per. 5, 6.

## Ord. 3. Trigynia.

### VIBURNUM. Guelder-rose.

1. *V. Lantana*, mealy. 5. 331. Chalky hedges. Shrub. 5.
2. *V. Opulus*, common. 5. 332. Watery groves and hedges. Shrub. 6.

### SAMRUCUS. Elder.

1. *S. Ebulus*, dwarf. 7. 475. Waste ground, rare. Per. 7.
2. *S. nigra*, common. 7. 476. Wood and hedges. Small tree. 6.

### STAPHYLEA. Bladder-nut.

- \*1. *S. pinnata*, common. 22. 1560. Hedges, rare. Shrub. 6.

### TAMARIX. Tamarisk.

1. *T. gallica*, common, or French. 19. 1318. South coast. Shrub. 7.

### CORRIGIOLA. Strap-wort.

1. *C. littoralis*, sand. 10. 668. South-west coast. Ann. 7, 8.

## Ord. 4. Tetragynia.

### PARNASSIA. Grafts of Parnassus.

1. *P. palustris*, common. 2. 82. Boggymoores. Per. 9, 10.

## Ord. 5. Pentagynia.

### STATICE. Sea Lavender.

1. *S. Armeria*, thrift. 4. 226. Mountains, and sea shore. Per. 7, 8.
2. *S. Limonium*, common. 2. 102. Muddy sea shore. Per. 7, 8.
3. *S. reticulata*, matted. 5. 328. Norfolk coast. Per. 7, 8.

### LINUM. Flax.

1. *L. usitatissimum*, common. 19. 1357. Fields. Ann. 7.
2. *L. perenne*, perennial blue. 1. 40. Chalky hills. Per. 6, 7.
3. *L. angustifolium*, narrow-leaved pale. 6. 381. Sand or limestone. Per. 7.
4. *L. catharticum*, purging. 6. 3<sup>o</sup>. Dry pastures. Ann. 6-8.

### SIBBALDIA. Sibbaldia.

1. *S. procumbens*, procumbent. 13. 897. Scottish mountains. Per. 7.

Ord. 6.

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## Ord. 6. *Hexagynia.*

### DROSEREA. Sun-dew.

1. *D. rotundifolia*, round-leaved. 13. 867. Turfy bogs. Per. 7, 8.
2. *D. longifolia*, long-leaved. 13. 868. Turfy bogs. Per. 7, 8.
3. *D. anglica*, great. 13. 869. Bogs, rare. Per. 7, 8.

### Ord. 7. *Polygynia.*

#### MYOSURUS. Moufetail.

1. *M. minimus*, least. 7. 435. Gravelly corn-fields. Ann. 5.

## Class 6. HEXANDRIA.

### Ord. 1. *Monogynia.*

#### GALANTHUS. Snowdrop.

1. *G. nivalis*, common. 1. 19. Meadows and orchards. Per. 2.

#### LEUCOJUM. Snowflake.

1. *L. aestivum*, summer. 9. 621. Moist meadows. Per. 5.

#### NARCISSUS. Narcissus.

1. *N. poeticus*, poetic. 4. 275. Sandy downs. Per. 5.
2. *N. biflorus*, pale. 4. 276. Sandy downs. Per. 4, 5.
3. *N. Pseudo-narcissus*, daffodil. 1. 17. Woods and pastures. Per. 3.

#### ALLIUM. Garlick.

1. *A. Ampeloprasum*, great round. 24. 1657. Severn isles. Per. 7.
2. *A. arenarium*, sand. 19. 1358. Mountain woods. Per. 7.
3. *A. carinatum*, mountain. 24. 1658. Rocks and mountains. Per. 7.
4. *A. oleraceum*, streaked field. 7. 488. Fields. Per. 7.
5. *A. vineale*, crow. 28. 1974. Chalky hills and fields. Per. 7.
6. *A. ursinum*, broad-leaved. 2. 122. Groves and thickets. Per. 5, 6.
7. *A. Schoenoprasum*, chive. 34. 2441. Meadows and pastures, rare. Per. 6.

#### FRITILLARIA. Fritillary.

1. *F. Meleagris*, common. 9. 622. Moist pastures. Per. 4.

#### TULIPA. Tulip.

1. *T. sylvestris*, wild yellow. 1. 63. Chalk-pits, rare. Per. 4.

#### ORNITHOGALUM. Star of Bethlehem.

1. *O. luteum*, yellow. 1. 21. Groves, rare. Per. 4.
2. *O. pyrenaicum*, spiked. 7. 499. Pastures and hills, rare. Per. 6, 7.
3. *O. umbellatum*, common. 2. 130. Meadows and pastures. Per. 4, 5.
4. *O. nutans*, drooping. 28. 1997. Dry meadows, rare. Per. 5.

#### HYACINTHUS. Hyacinth.

1. *H. racemosus*, starch. 27. 1391. Sandy ground, and walks. Per. 5.

## SCILLA. Squill.

1. *S. verna*, vernal. 1. 23. Sea cliffs. Per. 4.
2. *S. bifolia*, two-leaved. 1. 24. Woods in the west. Per. 3, 4.
3. *S. autumnalis*, autumnal. 2. 78. Dry pastures, rare. Per. 9.
4. *S. nutans*, hare-bell. 6. 377. Groves and pastures. Per. 5.

#### ANTHERICUM. Spider-wort.

1. *A. ferotinum*, mountain. 12. 793. Welsh mountains. Per. 6.

#### NARTHECIUM. Aphodel.

1. *N. officragum*, Lancashire. 8. 535. Turfy bogs. Per. 7, 8.

#### ASPARAGUS. Sperage.

1. *A. officinalis*, common. 5. 339. Stony sea-coast. Per. 8.

#### CONVALLARIA. Lilly of the Valley.

1. *C. majalis*, common. 15. 1035. Groves and thickets. Per. 5.
2. *C. verticillata*, narrow-leaved Solomon's seal. 2. 128. Woods, Scotland. Per. 6.
3. *C. Polygonatum*, angular Solomon's seal. 4. 280. Woods, rare. Per. 5, 6.
4. *C. multiflora*, common Solomon's seal. 4. 279. Woods. Per. 5, 6.

#### ACORUS. Sweet Flag.

1. *A. Calamus*, common. 5. 356. Watery places. Per. 6.

#### JUNCUS. Rush.

1. *J. acutus*, great sharp. 23. 1614. Sandy sea-coast. Per. 7.
  2. *J. maritimus*, lesser sharp. 24. 1725. Muddy sea-coast. Per. 8.
  3. *J. glaucus*, hard. 10. 665. Moist pastures. Per. 7.
  4. *J. conglomeratus*, common. 12. 835. Moist pastures. Per. 7.
  5. *J. effusus*, soft. 12. 836. Moist pastures. Per. 7.
  6. *J. filiformis*, least. 17. 1175. Alpine rills. Per. 8.
  7. *J. trifidus*, three-leaved. 21. 1482. Alpine bogs. Per. 7.
  8. *J. squarrosus*, moss. 13. 933. Sandy heaths. Per. 6, 7.
  9. *J. acutiflorus*, sharp-flowered jointed. 4. 238. (articulatus). Bogs. Per. 6.
- "Leaves with knotty joints, slightly compressed. Stem without joints. Panicle repeatedly forked, dense. Calyx-leaves all sharp-pointed."—*Stem* leafy. *Panicle* spreading, with upright branches. *Flowers* small.
10. *J. lampocarpus*, shining-fruited jointed. 30. 2143. Boggy ground. Per. 6, 7.

"Leaves with knotty joints, compressed. Stem without joints. Panicle compound, erect, elongated. Inner calyx-leaves bluntish, bordered. Capsule coloured, varnished."—*Stem* leafy. *Panicle* tall, many-flowered. *Capsule* large, of a dark chocolate hue, and highly polished.

11. *J. obtusiflorus*, blunt-flowered jointed. 30. 2144. Marshes. Per. 7, 8.

"Leaves and stem with knotty joints, cylindrical. Panicle repeatedly compound; its branches divaricated and reflexed. Calyx-leaves obtuse, as long as the capsule."—

*Stem*

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*Stem tall, but with only two leaves. Flowers and capsule small, brownish.*

12. *J. uliginosus*, little bulbous. 12. 801. Wet sandy heaths. Per. 6, 7.
13. *J. bulbosus*, round-fruited. 13. 934. Moist pastures. Per. 7.
14. *J. gracilis*, slender spreading. 31. 2174. Alpine bogs, rare. Per. 7.

“Leaves linear, flat. Stem forked, racemose, taller than the leaves. Flowers solitary.”

15. *J. bufonius*, toad. 12. 802. Sandy wet places. Ann. 7, 8.
16. *J. biglumis*, two-flowered. 13. 898. Alpine rills, rare. Per. 8.
17. *J. triglumis*, three-flowered. 13. 899. Alpine rills. Per. 7.
18. *J. castaneus*, clustered alpine. 13. 900. Highland bogs. Per. 7.
19. *J. pilosus*, broad-leaved hairy. 11. 736. Woods and groves. Per. 3, 4.
20. *J. Forsteri*, narrow-leaved hairy. 18. 1293. Groves. Per. 5.
21. *J. sylvaticus*, wood. 11. 737. Woods and thickets. Per. 5.
22. *J. campestris*, hairy field. 10. 672. Barren pastures. Per. 4, 5.
23. *J. spicatus*, spiked. 17. 1176. Highland hills. Per. 7.

### BERBERIS. Barberry.

1. *B. vulgaris*, common. 1. 49. Chalky banks. Shrub. 5, 6.

### FRANKENIA. Sea-Heath.

1. *F. Lewis*, smooth. 3. 205. Muddy salt-marshes. Per. 7.
2. *F. pulverulenta*, powdery. 31. 2222. Sufflex coast. Ann. 7.

### PEPLIS. Water-Purslane.

1. *P. Portula*, common. 17. 1211. Watery places. Ann. 7, 8.

### Ord. 2. Trigynia.

#### RUMEX. Dock.

1. *R. sanguineus*, bloody-veined. 22. 1533. Woods and way sides. Per. 7.
2. *R. crispus*, curled. 28. 1998. Rubbish and pastures. Per. 6, 7.
3. *R. acutus*, sharp. 11. 724. Watery and waste places. Per. 7.
4. *R. obtusifolius*, broad-leaved. 28. 1999. Waste ground. Per. 7, 8.
5. *R. pulcher*, fiddle. 22. 1576. Gravelly pastures. Per. 8.
6. *R. maritimus*, golden. 11. 725. Salt marshes. Per. 7, 8.
7. *R. palustris*, yellow marsh. 27. 1932. Marshes and ditches. Per. 7, 8.
8. *R. aquaticus*, great water. 30. 2104. Ditches and rivers. Per. 7, 8.
9. *R. digynus*, mountain forrel. 13. 910. Alpine rivulets. Per. 6.
10. *R. Acetosella*, common forrel. 2. 127. Meadows and pastures. Per. 6.
11. *R. Acetosella*, sheep's forrel. 24. 1674. Gravelly fields. Per. 6, 7.

### TOFIELDIA. Tofieldia.

1. *T. palustris*, Scottish aphodel. 8. 536. Alpine rills. Per. 8.

### SCHEUCHZERIA. Scheuchzeria.

1. *S. palustris*, marsh. 26. 1801. Bogs, Yorkshire. Per. 6.

### TRIGLOCHIN. Arrow-grass.

1. *T. palustre*, marsh. 6. 366. Marshes. Per. 7.
2. *T. maritimum*, sea. 4. 255. Muddy salt-marshes. Per. 5—8.

### COLCHICUM. Meadow-Saffron.

1. *C. autumnale*, common. 2. 133.  $\beta$ . 20. 1432. Rich meadows. Per. 9.

### Ord. 3. Polygynia.

#### ALISMA. Water-Plantain.

1. *A. Plantago*, greater. 12. 837. Ditches and pools. Per. 7.
2. *A. Damasonium*, star-headed. 23. 1615. Gravelly pools, rare. Per. 6, 7.
3. *A. natans*, floating. 11. 775. Alpine lakes, rare. Per. 7, 8.
4. *A. ranunculoides*, small. 5. 326. Watery turfy bogs. P. 8.

### Class 7. HEPTANDRIA.

#### Ord. 1. Monogynia.

#### TRIENTALIS. Trientalis.

1. *T. europaea*, chickweed. 1. 15. Woods and mountain heaths. Per. 5, 6.

### Class 8. OCTANDRIA.

#### Ord. 1. Monogynia.

#### OENOTHERA. Evening-Primrose.

1. *O. biennis*, common. 22. 1534. Sandy western coast. Bienn. 7—9.

#### EPILOBIUM. Willow-herb.

1. *E. angustifolium*, rose-bay. 28. 1947. Shady meadows. Per. 7.
2. *E. hirsutum*, great hairy. 12. 838. Watery places. Per. 7.
3. *E. parviflorum*, small-flowered, hoary. 12. 795. Watery places. Per. 7.
4. *E. montanum*, broad smooth-leaved. 17. 1177. Groves and stony places. Per. 7.
5. *E. roseum*, pale smooth-leaved. 10. 693. Boggy ground, rare. Per. 7.
6. *E. tetragonum*, square-stalked. 28. 1948. Marshes. Per. 7.
7. *E. palustre*, round-stalked, marsh. 5. 346. Marshes. Per. 7.
8. *E. alpinifolium*, chickweed-leaved. 28. 2000. Mountain rills. Per. 7.

“Leaves on footstalks, ovate, acute, toothed. Stigma undivided. Root creeping, matted. Stems decumbent, obtusely quadrangular.”—Mr. Winch has shewn this to be the

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the plant of the Cheviot hills, described by Ray, which has always been taken for *alpinum*.

9. *E. alpinum*, alpine. 28. 2001. Alpine rivulets, Scotland. Per. 6, 7.

## CHLORA. Yellow-Centaury.

1. *C. perfoliata*, common. 1. 60. Chalky banks. Ann. 7, 8.

## VACCINIUM. Whortle-berry.

1. *V. Myrtillus*, bilberry. 7. 456. Heaths and woods. Shrub. 5.
2. *V. uliginosum*, great bilberry. 9. 581. Marshy heaths. Shrub. 4, 5.
3. *V. Vitis Idæa*, red. 9. 598. Dry stony moors. Shrubby. 6.
4. *V. Oxycoccus*, cranberry. 5. 319. Mossy bogs. Per. 6.

## MENZIESIA. Menziesia.

1. *M. cærulea*, Scottish. 35. 2469. West of Scotland. Shrubby. 6, 7.
2. *M. Dabecci*, Irish. 1. 35. (*Erica Dabecci*.) West of Ireland. Shrubby. 6, 7.

## ERICA. Heath.

1. *E. vulgaris*, common. 15. 1013. Heaths and woods. Shrub. 6, 7.
2. *E. Tetralix*, cross-leaved. 15. 1014. Bogs. Shrubby. 7, 8.
3. *E. cinerea*, fine-leaved. 15. 1015. Heaths. Shrub. 7, 8.
4. *E. vagans*, Cornish. 1. 3. Heaths, Cornwall. Shrub. 7, 8.

## DAPHNE. Mezereon.

1. *D. Mezereum*, spurge-olive. 20. 1381. Woods, rare. Shrub. 3, 4.
2. *D. Laureola*, spurge-laurel. 2. 119. Bushy places. Shrub. 3.

## ACER. Maple.

- \*1. *A. Pseudo-platanus*, greater, or sycamore. 5. 303. Woods. Tree. 5.
2. *A. campestre*, common. 5. 304. Woods and hedges. Tree. 5, 6.

## Ord. 2. Trigynia.

### POLYGONUM. Persicaria.

1. *P. amphibium*, amphibious. 7. 436. Ponds and ditches. Per. 7, 8.
2. *P. Persicaria*, spotted. 11. 756. Ditches and bogs. Ann. 7, 8.
3. *P. lapathifolium*, pale-flowered. 20. 1382. Dughills. Ann. 7, 8.
4. *P. Hydropiper*, biting. 14. 989. Watery places. Ann. 9.
5. *P. minus*, small creeping. 15. 1043. Gravelly puddles. Ann. 9.
6. *P. Biflora*, great bistort. 8. 509. Meadows. Per. 6.
7. *P. viviparum*, alpine bistort. 10. 669. Highland mountains. Per. 6, 7.
8. *P. aviculare*, knot-grass. 18. 1252. Rubbish and sand. Ann. 4—10.
- \*9. *P. Fagopyrum*, buck-wheat. 15. 1044. Fields. Ann. 7, 8.

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10. *P. Convolvulus*, black bindweed. 14. 941. Corn-fields. Ann. 6, 7.

## Ord. 3. Tetragynia.

### PARIS. Herb Paris.

1. *P. quadrifolia*, common. 1. 7. Shady groves. Per. 5.

## ADOXA. Moschatell.

1. *A. Moschatellina*, tuberous. 7. 453. Groves and banks. Per. 4, 5.

## ELATINE. Waterwort.

1. *E. Hydropiper*, small. 14. 955. Borders of lakes, rare. Ann. 8.

## Class 9. ENNEANDRIA.

### Ord. 1. Hexagynia.

### BUTOMUS. Flowering-Rush.

1. *B. umbellatus*, common. 10. 651. Rivers and ditches. Per. 6, 7.

## Class 10. DECANDRIA.

### Ord. 1. Monogynia.

### MONOTROPA. Bird's-nest.

1. *M. Hypopithys*, yellow. 1. 69. Beech or Fir woods. Per. 6.

### ANDROMEDA. Andromeda.

1. *A. polifolia*, marsh. 10. 713. Turfy bogs. Shrubby. 6.

### ARBUTUS. Arbutus.

1. *A. Unedo*, strawberry tree. 34. 2377. Rocks, Ireland. Shrub. 9.
2. *A. alpina*, black-berried alpine. 29. 2030. Stony hills, rare. Shrubby. 5.
3. *A. Uva ursi*, red-berried trailing. 10. 714. Alpine moors. Shrubby. 6.

### PYROLA. Winter-green.

1. *P. rotundifolia*, round-leaved. 3. 213. Mountain thickets, rare. Per. 7.
2. *P. media*, intermediate. 28. 1945. North of England, woods. Per. 6.
3. *P. rosea*, rose-coloured. 36. 2543. North of England, woods. Per. 7.
4. *P. minor*, lesser. 3. 158? Woods, and mountain thickets. Per. 7.
5. *P. secunda*, ferrated. 8. 517. Alpine woods. Per. 7.
6. *P. uniflora*, single-flowered. 3. 146. Alpine woods, rare. Per. 7.

## Ord. 2. Digynia.

### CHIRYSOSPLENIUM. Golden-Saxifrage.

1. *C. alternifolium*, alternate-leaved. 1. 54. Shady rills, rare. Per. 5.
2. *C. oppositifolium*, opposite-leaved. 7. 490. Shady rills. Per. 5.

4 M

SAXIFRAGA.

PLANTS.

SAXIFRAGA. Saxifrage.

1. *S. stellaris*, hairy. 3. 167. Mountain rivulets. Per. 6, 7.
2. *S. nivalis*, clustered alpine. 7. 440. Tops of Highland mountains. Per. 7.
3. *S. umbrosa*, London pride. 10. 663. Mountains. Per. 6.
4. *S. hirsuta*, hairy oval-leaved. 33. 2322. Mountains, Ireland. Per. 6.
5. *S. Geum*, kidney-leaved. 22. 1561. Mountains, Ireland. Per. 6.
6. *S. oppositifolia*, purple. 1. 9. Alpine rocks. Per. 4.
7. *S. Hirculus*, yellow marsh. 15. 1009. Turfy bogs, very rare. Per. 8.
8. *S. aizoides*, yellow mountain. 1. 39. Mountain rivulets. Per. 7, 8.
9. *S. granulata*, white. 7. 500. Meadows and pastures. Per. 5.
10. *S. cernua*, drooping bulbous. 10. 664. Wet alpine rocks. Per. 7.
11. *S. rivularis*, alpine brook. 32. 2275. Alpine rivulets. Per. 6, 7.
12. *S. tridactylites*, rue-leaved. 7. 501. Walls. Ann. 5.
13. *S. caespitosa*, tufted alpine. 12. 794. Alpine rocks, rare. Per. 6.
14. *S. moschata*, musky alpine. 33. 2314. Alpine rocks, rare. Per. 6, 7.
15. *S. palmata*, palmate. 7. 455. Rocky mountains. Per. 5, 6.
16. *S. hirta*, trifid hairy. 32. 2291. Highlands of Scotland. Per. 5, 6.
17. *S. platyptala*, broad-petalled. 32. 2276. Snowdon, and Scotland. Per. 6.
18. *S. elongella*, long-stalked. 32. 2277. Scottish mountains. Per. 6.
19. *S. hypnoides*, mossy cushion. 7. 454. Mountains. Per. 5, 6.
20. *S. pedatifida*, pedatifid. 32. 2278. Highlands of Scotland. Per. 5, 6.

SCLEFRANTHIUS. Knawel.

1. *S. annuus*, annual. 5. 351. Sandy fields, common. Ann. 7.
2. *S. perennis*, perennial. 5. 352. Sandy heaths, rare. Per. 10, 11.

SAPONARIA. Soapwort.

1. *S. officinalis*, common. 15. 1060. Meadows and hedges. Per. 8, 9.

DIANTHUS. Pink.

1. *D. Armeria*, Deptford. 5. 317. Gravelly pastures. Ann. 7, 8.
2. *D. prolifer*, proliferous. 14. 956. Gravelly banks, rare. Ann. 7.
3. *D. Caryophyllus*, clove. 3. 214. Walls. Per. 7.
4. *D. deltoides*, maiden. 1. 61. Gravelly pastures. Per. 7—10.
5. *D. caesus*, mountain. 1. 62. Dry limestone rocks, rare. Per. 6, 7.

Ord. 3. Trigynia.

CUCUBALUS. Berry-Chickweed.

1. *C. baccifer*, black-fruited. 22. 1577. Anglefea, *Dillenius*. Per. 6, 7.

SILENE. Catchfly.

1. *S. anglica*, English. 17. 1178. Sandy fields. Ann. 7.
  2. *S. quinquevulnera*, variegated. 2. 86. Sandy fields. Ann. 6, 7.
  3. *S. nutans*, Nottingham. 7. 465. Calcareous rocks. Per. 6, 7.
- S. paradoxa*, mentioned in the Fl. Brit. 467, is to be excluded, as not really of British growth. The Dover Catchfly, *Lychnis major noctiflora Dubrensis perennis*, Raii Syn. 340, has not been found since the time of Ray; and the old specimens, preserved in the British Museum, appear to be something unknown to modern botanists, though not sufficiently perfect to afford specific characters. They are most like the Linnæan *Cucubalus viscosus*, for which Ray's plant was originally taken by Linnæus and Hudson.
4. *S. inflata*, bladder. 3. 164. Fields and banks, common. Per. 7.
  5. *S. maritima*, sea. 14. 957. Stony shores and mountains. Per. 8, 9.
  6. *S. Otites*, Spanish. 2. 85. Dry fields and heaths, rare. Per. 7, 8.
  7. *S. conica*, corn. 13. 922. Sandy corn-fields. Ann. 7.
  8. *S. noctiflora*, night-flowering. 5. 291. Gravelly fields. Ann. 7.
  - \*9. *S. Armeria*, common, or Lobel's. 20. 1398. Fields and banks. Ann. 7, 8.
  10. *S. acaulis*, moss. 16. 1081. Mountains. Per. 6, 7.

STELLARIA. Stitchwort.

1. *S. nemorum*, wood. 2. 92. Moist woods, in the north. Per. 5, 6.
2. *S. media*, common chickweed. 8. 537. Waste and cultivated ground. Ann. 4—10.
3. *S. holostea*, greater. 8. 511. Dry groves. Per. 5.
4. *S. graninea*, lesser. 12. 803. Pastures and bushes. Per. 5.
5. *S. glauca*, glaucous marsh. 12. 825. Wet meadows. Per. 6, 7.
6. *S. uliginosa*, bog. 15. 1075. Watery places. Ann. 6.
7. *S. scapigera*, many-stalked. 18. 1269. Rivulets, Scotland. Per. 6.
8. *S. cerasoides*, alpine. 13. 911. Highland mountains. Per. 6.

ARENARIA. Sandwort.

1. *A. peploides*, sea. 3. 189. Sandy beach. Per. 6, 7.
2. *A. trimeris*, plantain-leaved. 21. 1483. Groves. Ann. 5, 6.
3. *A. serpyllifolia*, thyme-leaved. 13. 923. Banks and walls. Ann. 6, 7.
4. *A. rubra*, purple. 12. 852. Sandy fields. Ann. 7, 8.
5. *A. marina*, sea spurrey. 14. 958. Sandy beach. Ann. 6, 7.
6. *A. tenuifolia*, fine-leaved. 4. 219. Sand and walls. Ann. 6.
7. *A. verna*, vernal. 8. 512. Sparry hills. Per. 5—8.
8. *A. fastigiata*, level-topped. 25. 1744. Scottish mountains. Ann. 6.
9. *A. ciliata*, fringed. 25. 1745. Irish mountains. Per. 8.

CHELERIA. Cherleria.

1. *C. sedoides*, dwarf. 17. 1212. Highland mountains. Per. 7.

Ord.

# PLANTS.

## Ord. 4. *Pentagynia*.

### COTYLEDON. Navelwort.

1. *C. Umbilicus*, common. 5. 325. Shady rocks. Per. 6, 7.
2. *C. lutea*, greater yellow. 22. 1522. Moist rocks and walls, rare. Per. 6.

### SEDUM. Stone-crop.

1. *S. Telephium*, orpine. 19. 1319. Fields and thickets. Per. 8.
2. *S. dasycyllum*, thick-leaved. 10. 656. Walls and stones. Per. 6.
3. *S. anglicum*, English. 3. 171. Mountains, and sea shore. Ann. 7.
4. *S. acre*, biting. 12. 839. Walls and dry sand. Per. 6.
5. *S. sexangulare*, infipid. 28. 1946. Walls, rare. Per. 6, 7.
6. *S. villosum*, hairy. 6. 394. Mountain rills. Per. 6, 7.
7. *S. album*, white. 22. 1578. Rocks and walls, rare. Per. 7.
8. *S. reflexum*, yellow. 10. 695. Walls and roofs, common. Per. 7.
9. *S. glaucum*, glaucous. 35. 2477. Barren sands. Per. 7, 8.
10. *S. rupestre*, rock. 3. 170. Rocks, rare. Per. 7.
11. *S. Forsterianum*, Forsterian. 26. 1802. Rocks, Wales. Per. 7.

### OXALIS. Wood-Sorrel.

1. *O. Acetofella*, common. 11. 762. Woods. Per. 4, 5.
2. *O. corniculata*, yellow procumbent. 24. 1726. Shady rocks. Per. 5—10.

### AGROSTEMMA. Cockle.

1. *A. Gibbago*, corn. 11. 741. Corn-fields. Ann. 6, 7.

### LYCHNIS. Campion.

1. *L. Flos cuculi*, ragged robin. 8. 573. Moist meadows. Per. 6.
2. *L. Viscaria*, German catchfly. 11. 788. Rocks; rare. Per. 5, 6.
3. *L. alpina*, red alpine. 32. 2254. Highland rocks. Per. 6, 7.
4. *L. dioica*, red or white. 22. 1579, 1580. Groves, and fields. Per. 5—9.

### CERASTIUM. Chickweed.

1. *C. vulgatum*, broad mouse-ear. 11. 789. Pastures and rubbish. Ann. 4, 5.
2. *C. viscosum*, narrow mouse-ear. 11. 790. Pastures and rubbish. Per. 5—9.
3. *C. semidecandrum*, little mouse-ear. 23. 1630. Walls and sand. Ann. 4, 5.
4. *C. tetrandrum*, tetrandrous mouse-ear. 3. 166. Rocks and sand, Scotland. Ann. 5, 6.
5. *C. arvense*, field. 2. 93. Gravelly fields. Per. 5—8.
6. *C. alpinum*, alpine. 7. 472. Alpine rills. Per. 6, 7.
7. *C. latifolium*, broad rough. 7. 473. Alpine rocks. Per. 6.
8. *C. aquaticum*, water. 8. 538. Watery places. Per. 7.

### SPERGULA. Spurrey.

1. *S. arvensis*, rough-seeded corn. 22. 1535. Sandy fields. Ann. 7, 8.

2. *S. pentandra*, smooth-seeded corn. 22. 1536. Sandy fields. Ann. 7, 8.
3. *S. nodosa*, knotted. 10. 694. Moist sandy heaths. Per. 7, 8.
4. *S. faginoides*, smooth awl-shaped. 30. 2105. Highland mountains. Per. 6.
5. *S. subulata*, ciliated awl-shaped. 16. 1082. Sandy heaths. Per. 7, 8.

## Class II. DODECANDRIA.

### Ord. 1. *Monogynia*.

#### ASARUM. Afarabacca.

1. *A. europæum*, common. 16. 1083. Woods, rare. Per. 5.

#### LYTHRUM. Lythrum.

1. *L. Salicaria*, purple. 15. 1061. Watery places. Per. 7, 8.
2. *L. hyssopifolia*, hyssop-leaved. 5. 292. Inundated ground. Ann. 8.

### Ord. 2. *Digynia*.

#### AGRIMONIA. Agrimony.

1. *A. Eupatoria*, common. 19. 1335. Thickets and hedges. Per. 6, 7.

### Ord. 3. *Trigynia*.

#### RESEDA. Mignonette.

1. *R. Iuteola*, dyer's-weed. 5. 320. Fields and rubbish. Ann. 7.
2. *R. lutea*, wild, or bafe rocket. 5. 321. Fields and chalky hills. Ann? 7, 8.

#### EUPHORBIA. Spurge.

1. *E. Peplis*, purple. 28. 2002. Sandy south coast. Ann. 7, 8.
2. *E. Peplus*, petty. 14. 959. Cultivated ground, common. Ann. 7, 8.
3. *E. exigua*, dwarf. 19. 1336. Corn-fields, rare. Ann. 7.
4. *E. Lathyris*, caper. 32. 2255. Dry stony places, rare. Bienn. 5, 6.
5. *E. Portlandica*, Portland. 7. 441. South coast. Per. 8.
6. *E. paralia*, sea. 3. 195. Sandy sea shore. Per. 8, 9.
7. *E. helioscopia*, sun. 13. 883. Cultivated ground. Ann. 7, 8.
8. *E. platyphylla*, warty. 5. 333. Corn-fields, rare. Ann. 7, 8.
9. *E. Esula*, leafy-branched. 20. 1399. Woods, Scotland. Per. 7.
10. *E. Cyparissias*, cyprefs. 12. 840. Woods and barren ground. Per. 5, 6.
11. *E. hiberna*, Irish. 19. 1337. Fields, rare. Per. 6.
12. *E. amygdaloides*, wood. 4. 256. Woods and groves. Per. 3, 4.
13. *E. Characias*, red. 7. 442. Mountainous places, rare. Shrub. 3, 4.

### Ord. 4. *Dodecagynia*.

#### SEMPERVIVUM. Houfeleek.

1. *S. tetlorum*, common. 19. 1320. Roofs and walls. Per. 7.

## PLANTS,

### Class 12. ICOSANDRIA.

#### Ord. 1. *Monogynia*.

#### PRUNUS. Cherry or Plum.

1. *P. Padus*, bird cherry. 20. 1383. Woods and hedges. Tree. 5.
2. *P. Cerasus*, common cherry. 10. 706. Woods and hedges. Tree. 5.
- \*3. *P. domestica*, common plum. 25. 1783. Hedges. Tree. 4.
4. *P. infirmitia*, bullace. 12. 841. Hedges and groves. Tree. 4.
5. *P. spinosa*, sloe. 12. 842. Hedges and thickets. Shrub. 3, 4.

#### Ord. 2. *Pentagynia*.

#### MESPILUS. Medlar.

1. *M. Oxyacantha*, hawthorn. 35. 2504. Hedges and thickets. Small tree. 5, 6.
- \*2. *M. germanica*, common eatable. 22. 1523. Hedges, rare. Tree. 5.

#### PYRUS. Pear.

1. *P. communis*, common. 25. 1784. Woods and hedges. Tree. 4.
2. *P. Malus*, apple, or crab. 3. 179. Woods and hedges. Tree. 5.
3. *P. torminalis*, wild service. 5. 298. Woods and hedges. Tree. 4, 5.
4. *P. domestica*, true service. 5. 350. Mountain woods, rare. Tree. 5.
5. *P. aucuparia*, mountain ash. 5. 337. Mountain woods. Tree. 5.
6. *P. pinnatifida*, bastard mountain ash. 33. 2331. Rocks, rare. Tree. 5.
7. *P. Aria*, white beam-tree. 26. 1858. Limestone rocks. Tree. 5.

#### SPIRÆA. Spiræa.

1. *S. salicifolia*, willow-leaved. 21. 1468. Wet mountain thickets. Shrub. 7.
2. *S. Filipendula*, dropwort. 4. 284. Dry open pastures. Per. 7.
3. *S. Ulmaria*, meadow-sweet. 14. 960. Moist meadows. Per. 6, 7.

#### Ord. 2. *Polygynia*.

#### ROSA. Rose.

1. *R. spinosissima*, burnet. 3. 187. Sandy heaths. Low shrub. 7.
2. *R. rubella*, red-fruited dwarf. 36. 2521. Northumberland. Low shrub. 7.
3. *R. involuta*, prickly unexpanded. 29. 2068. Western hills. Low shrub. 6.
4. *R. hibernica*, Irish. 31. 2196. Ireland. Shrub. 6—11.
5. *R. arvensis*, white field. 3. 188. Hedges and thickets. Shrub. 6, 7.
6. *R. villosa*, apple. 9. 583. Mountain thickets. Shrub. 6.
7. *R. mollis*, soft-leaved round-fruited. 35. 2459. Thickets. Low shrub. 6.
8. *R. cinnamomea*, cinnamon. 34. 2388. Thickets, Yorkshire. Shrub. 5.
9. *R. tomentosa*, dowys-leaved briar. 14. 990. Woods and hedges. Shrub. 6, 7.

10. *R. rubiginosa*, sweet briar. 14. 991. Gravelly heaths. Shrub. 6, 7.
11. *R. micrantha*, small-flowered sweet briar. 35. 2490. Hedges. Shrub. 6, 7.
12. *R. scabriuscula*, roughish-leaved briar. 27. 1896. Hedges. Shrub. 6.
13. *R. casta*, glaucous-leaved. 33. 2367. Highland valleys. Shrub. 7.
14. *R. canina*, common dog-briar. 14. 992. Hedges. Shrub. 6.
15. *R. collina*, rough-stalked dog-briar. 27. 1895. Thickets, Suffex. 7.
16. *R. dumetorum*, downy-stalked dog-briar. 36. 2579. Thickets, Suffex. 7.

#### RUBUS. Bramble.

1. *R. idæus*, raspberrry. 34. 2442. Woods and thickets. Shrub. 5, 6.
2. *R. suberecæus*, red-fruited. 36. 2572. Northern woods. Shrub. 6.
3. *R. cæsius*, dew-berry. 12. 826. Groves and hedges. Shrub. 6, 7.
4. *R. corylifolius*, hazel-leaved. 12. 827. Hedges. Shrub. 7.
5. *R. fruticosus*, common. 10. 715. Hedges. Shrub. 7, 8.
6. *R. saxatilis*, stone. 32. 2233. Mountain woods. Per. 6.
7. *R. arcticus*, dwarf crimson. 23. 1585. Stony hills, rare. Per. 5, 6.
8. *R. Chamæmorus*, cloud-berry. 10. 716. Mountain moors. Per. 6.

#### FRAGARIA. Strawberry.

1. *F. vesca*, common. 22. 1524. Groves and banks. Per. 5, 6.
2. *F. elatior*, hautboy. 31. 2197. Woods in the south, rare. Per. 6, 9.
3. *F. sterilis*, barren. 25. 1785. Barren pastures. Per. 3, 4.

#### POTENTILLA. Cinquefoil.

1. *P. fruticosa*, shrubby. 2. 88. Mountain thickets, Yorkshire. Shrub. 6.
2. *P. anserina*, silver-weed. 12. 861. Boggy meadows. Per. 6, 7.
3. *P. rupestris*, strawberry-flowered. 29. 2058. Rocks, Wales. Per. 6, 7.
4. *P. argentea*, hoary. 2. 89. Gravelly pastures. Per. 6.
5. *P. aurea*, golden. 8. 561. Highland mountains. Per. 7.
6. *P. verna*, spring. 1. 37. High open pastures. Per. 4, 5.
7. *P. opaca*, faw-leaved hairy. 35. 2449. Highlands. Per. 6.
8. *P. alba*, white. 20. 1384. Welch mountains. Per. 7, 8.
9. *P. reptans*, common creeping. 12. 862. Meadows and pastures. Per. 6—8.
10. *P. tridentata*, trifold-leaved. 34. 2389. Highlands. Per. 5, 6.

#### TORMENTILLA. Tormentil.

1. *T. officinalis*, common. 12. 863. Heaths and pastures. Per. 6, 7.
2. *T. reptans*, trailing. 12. 864. Hedges, rare. Per. 6, 7.

GEUM.

# PLANTS.

## GENM. Avens.

1. *G. urbanum*, common. 20. 1400. Woods and hedges. Per. 5—8.
2. *G. rivale*, water. 2. 106. Moist shady meadows. Per. 6, 7.

## DRYAS. Mountain-avens.

1. *D. octopetala*, white. 7. 451. Alpine moors. Per. 7, 8.

## COMARUM. Marsh-cinquefoil.

1. *C. pulifstre*, common. 3. 172. Spongy bogs. Per. 6, 7.

## Clafs 13. POLYANDRIA.

### Ord. 1. Monogynia.

#### ACTÆA. Bane-berries.

1. *A. fpicata*, herb christopher. 13. 918. Mountain groves, rare. Per. 5, 6.

#### CHELIDONIUM. Celandine.

1. *C. majus*, common. 22. 1581. Shady banks. Per. 5, 6.

#### GLAUCIUM. Horned-poppy.

1. *G. luteum*, yellow. 1. 8. Sandy sea-coast. Per. 7, 8.
- † 2. *G. phoeniceum*, scarlet. 20. 1433. Sandy fields. Ann. 6, 7.
3. *G. violaceum*, violet. 3. 201. Chalky fields, rare. Ann. 5, 6.

#### PAPAVER. Poppy.

1. *P. hybridum*, mongrel. 1. 43. Chalky fields, rare. Ann. 7.
2. *P. Argemone*, long-rough-headed. 9. 643. Corn-fields. Ann. 6, 7.
3. *P. dubium*, long-smooth-headed. 9. 644. Sandy fields. Ann. 6—8.
4. *P. Rhœas*, common red. 9. 645. Corn-fields. Ann. 6, 7.
5. *P. fœmiferum*, white. 30. 2145. Sandy fen-banks. Ann. 7.
6. *P. cambricum*, yellow. 1. 66. Shady rocks. Per. 6.

#### NYMPHÆA. Water-lily.

1. *N. alba*, white. 3. 160. Pools, rivers and lakes. Per. 7.

#### NUPHAR. Yellow water-lily.

1. *N. lutea*, common. 3. 159. Pools and rivers. Per. 7.
2. *N. minima*, least, 32. 2292. Alpine lakes. Per. 7.

#### TILIA. Lime-tree.

1. *T. europœa*, common. 9. 610. Woods and hedges. Tree. 7.
2. *T. parvifolia*, small-leaved. 24. 1705. Woods. Tree. 8.

#### CISTUS. Cistus.

1. *C. marifolius*, hoary dwarf. 6. 396. Rocks, rare. Dwarf shrub. 5, 6.
2. *C. guttatus*, spotted-flowered. 8. 544. Sandy pastures, rare. Ann. 6: 7.
3. *C. ledifolius*, ledum-leaved. 34. 2414. Sandy pastures, rare. Ann. 6, 7.
4. *C. furzeanus*, dotted-leaved. 31. 2207. Chalk hills, rare. Shrub. 7, 8.
5. *C. Helianthemum*, common dwarf. 19. 1321. Gravelly banks. Shrub. 7, 8.

6. *C. tomentosus*, downy. 31. 2208. Highland hills. Shrubby 7.
7. *C. polifolius*, white mountain. 19. 1322. Open downs. rare. Shrubby 6, 7.

### Ord. 2. Pentagynia.

#### PÆONIA. Pæony.

1. *P. corallina*, entire-leaved. 22. 1513. Severn ifles. Per. 5, 6.

#### DELPHINIUM. Larkspur.

1. *D. Consolida*, field. 26. 1839. Sandy fields. Ann. 6, 7.

#### AQUILEGIA. Columbine.

1. *A. vulgaris*, common. 5. 297. Meadows and pastures. Per. 7.

#### STRATIOTES. Water-aloë.

1. *S. aloides*, common. 6. 379. Ditches and pools. Per. 7.

### Ord. 3. Polygynia.

#### ANEMONE. Anemone.

1. *A. Pulsatilla*, pasque-flower. 1. 51. Chalky hills. Per. 4, 5.
2. *A. nemorofa*, common wood. 5. 355. Groves and heaths. Per. 4, 5.
3. *A. apennina*, blue mountain. 15. 1062. Groves, rare. Per. 4.
4. *A. ranunculoides*, yellow wood. 21. 1484. Groves, rare. Per. 4.

#### CLEMATIS. Traveller's joy.

1. *C. Vitalba*, common. 9. 612. Hedges, chalky foil. Shrub. 7.

#### THALICTRUM. Meadow-rue.

1. *T. alpinum*, alpine. 4. 262. Alpine bogs. Per. 6.
2. *T. minus*, lesser. 1. 11. Calcareous pastures. Per. 6, 7.
3. *T. majus*, greater. 9. 611. Mountain thickets. Per. 6, 7.
4. *T. flavum*, common. 6. 367. Moist meadows. Per. 7.

#### ADONIS. Pheasant's-eye.

1. *A. autumnalis*, corn. 5. 308. Corn-fields. Ann. 5—10.

#### RANUNCULUS. Crowfoot.

1. *R. Flammula*, lesser spear-wort. 6. 387. Watery places. Per. 6—9.
2. *R. Lingua*, great spear-wort. 2. 100. Ditches. Per. 7.
3. *R. gramineus*, grassy. 33. 2306. Alpine meadows. Per. 5, 6.
4. *R. Ficaria*, pile-wort. 9. 584. Groves and banks. Per. 4.
5. *R. auricomus*, wood. 9. 624. Dry groves. Per. 4, 5.
6. *R. fcleratus*, water. 10. 681. Watery places. Ann. 6—8.
7. *R. alpeftris*, alpine white. 34. 2390. Alpine rills. Per. 5.
8. *R. bulbofus*, bulbous. 8. 515. Meadows and pastures. Per. 5.
9. *R. hirsutus*, pale hairy. 21. 1504. Waste and cultivated ground. Ann. 6—10.

*R. parvulus* of Linnæus, and Fl. Brit. 593, found below Britol hot-wells by Mr. Dyer, and by several botanists at Montpellier, proves a starved variety of our *hirsutus*, a species

## PLANTS.

species unnoticed by Linnæus. Mr. Curtis, in describing the latter, had not adverted to the tuberculated feeds, by which it, in all its varieties, is readily and essentially distinguished from *bulbosus*.

10. *R. repens*, creeping. 8. 516. Meadows and rubbish. Per. 6—8.
11. *R. acris*, upright meadow. 10. 652. Meadows and pastures. Per. 6, 7.
12. *R. arvensis*, corn. 2. 135. Corn-fields. Ann. 6.
13. *R. parviflorus*, small-flowered. 2. 120. Gravelly fields. Ann. 5, 6.
14. *R. hederaceus*, ivy-leaved. 28. 2003. Inundated places. Per. 5—8.
15. *R. aquatilis*, white floating. 2. 101. Ditches, pools, and rivers. Per. 5, 6.

### TROLLIUS. Globe-flower.

1. *T. europæus*, common. 1. 28. Mountain groves. Per. 5, 6.

### HELLEBORUS. Hellebore.

1. *H. viridis*, green. 3. 200. Chalky woods, rare. Per. 4.
2. *H. fatidus*, stinking. 9. 613. Chalky banks. Per. 3, 4.

### CALTHA. Marsh-marigold.

1. *C. palustris*, common. 8. 506. Wet meadows. Per. 5.
2. *C. radicans*, creeping. 31. 2175. Bogs, Scotland. Per. 6.

## Class 14. DIDYNAMIA.

### Ord. 1. Gymnospermia.

#### AJUGA. Bugle.

1. *A. reptans*, common. 7. 489. Moist groves. Per. 5.
2. *A. alpina*, alpine. 7. 477. Mountains. Per. 7.
3. *A. pyramidalis*, pyramidal. 18. 1270. Highland hills. Per. 5, 6.
4. *A. Chamæpitys*, ground pine. 2. 77. Sandy fields. Ann. 4, 5.

#### TEUCRIUM. Germander.

1. *T. Scorodonia*, wood. 22. 1543. Woods and heaths. Per. 7.
2. *T. Scordium*, water. 12. 828. Boggy meadows, rare. Per. 7, 8.
3. *T. Chamædryas*, wall. 10. 680. Old walls. Per. 7.

#### NEPETA. Cat-mint.

1. *N. cataria*, common. 2. 137. Chalky banks. Per. 7.

#### VERBENA. Vervain.

1. *V. officinalis*, common. 11. 767. Pastures and rubbish. Per. 7.

#### MENTHA. Mint.

1. *M. sylvestris*, horfe. 10. 686. Moist waste ground. Per. 8, 9.
2. *M. rotundifolia*, round-leaved. 7. 446. Moist ground, rare. Per. 8, 9.
3. *M. viridis*, spear. 34. 2424. Wet meadows. Per. 8.
4. *M. piperita*, pepper. 10. 687. Watery places. Per. 8, 9.
5. *M. odorata*, bergamot. 15. 1025. Wet ground, rare. Per. 7, 8.

6. *M. birfuta*, hairy. 7. 447, 448, (*fativa*). Watery places. Per. 8, 9.

7. *M. acutifolia*, fragrant sharp-leaved. 34. 2415. River banks, rare. Per. 9.

8. *M. rubra*, tall red. 20. 1413. Wet hedges. Per. 9.

9. *M. gentilis*, bushy red. 30. 2118. Wet waste ground, rare. Per. 8.

10. *M. gracilis*, narrow-leaved. 7. 449, (*gentilis*). Waste ground. Per. 8.

11. *M. arvensis*, corn. 30. 2119. Wet corn-fields. Per. 6—9.

12. *M. agrestis*, rugged field. 30. 2120. Fields. Per. 8.

13. *M. Pulegium*, penny-royal. 15. 1026. Watery pastures. Per. 9.

### GLECHOMA. Ground-ivy.

1. *G. hederacea*, common. 12. 853. Woods and hedges. Per. 4, 5.

### LAMIUM. Dead-nettle.

1. *L. album*, white. 11. 768. Waste ground. Per. 5—9.

2. *L. maculatum*, spotted. 36. 2550. Banks, rare. Per. 4.

3. *L. purpureum*, red. 11. 769. Waste and cultivated ground. Ann. 5—9.

4. *L. incisum*, cut-leaved. 27. 1933. Sandy fields. Ann. 5.

5. *L. amplexicaule*, henbit. 11. 770. Sandy fields. Ann. 2—6.

### GALEOPSIS. Hemp-nettle.

1. *G. Ladanum*, red. 13. 884. Chalky fields. Ann. 8, 9.

2. *G. villosa*, downy. 33. 2353. Sandy fields, rare. Ann. 7, 8.

3. *G. Tetrabit*, common. 3. 207. Corn-fields. Ann. 7, 8.

4. *G. versicolor*, large-flowered. 10. 667. Sandy fields. Ann. 7, 8.

### GALEOBOLON. Weasel-snout.

1. *G. luteum*, yellow. 11. 787. Moist groves. Per. 5.

### BETONICA. Betony.

1. *B. officinalis*, wood. 16. 1142. Woods and thickets. Per. 7, 8.

### STACHYS. Wound-wort.

1. *S. sylvatica*, hedge. 6. 416. Hedges and groves. Per. 7, 8.

2. *S. ambigua*, ambiguous. 30. 2089. North of Scotland. Per. 9.

3. *S. palustris*, marsh. 24. 1675. Wet meadows. Per. 8.

4. *S. germanica*, downy. 12. 829. Chalky fields. Per. 7.

5. *S. arvensis*, corn. 17. 1154. Gravelly fields. Ann. 7, 8.

### BALLOTA. Black-horehound.

1. *B. nigra*, stinking. 1. 46. Hedges and rubbish. Per. 7, 8.

### MARRUBIUM. White-horehound.

1. *M. vulgare*, aromatic. 6. 410. Dry waste ground. Per. 7.

### LEONURUS. Motherwort.

1. *L. Cardiaca*, common. 4. 286. Gravelly banks. Per. 7, 8.

### CLINPODIUM. Basil.

1. *C. vulgare*, wild. 20. 1401. Gravelly or chalky banks. Per. 8.

### ORIGANUM

# PLANTS.

## ORIGANUM. Marjoram.

1. *O. vulgare*, common. 16. 1143. Calcareous thickets. Per. 7, 8.

## THYMUS. Thyme.

1. *T. Serpyllum*, wild. 22. 1514. Heaths and hills. Per. 7, 8.
2. *T. Acinos*, basil. 6. 411. Sandy fields. Ann. 7, 8.
3. *T. Calamintha*, common calamint. 24. 1676. Gravelly banks. Per. 7, 8.
4. *T. Nepeta*, lesser calamint. 20. 1414. Chalky banks. Per. 8.

## MELITTIS. Baitard-balm.

1. *M. Melissophyllum*, reddish. 9. 577. Woods, west of England. Per. 5, 6.
2. *M. grandiflora*, purple and white. 9. 636. Woods, west of England. Per. 5.

## SCUTELLARIA. Scull-cap.

1. *S. galericulata*, common. 8. 523. Watery places. Per. 7, 8.
2. *S. minor*, lesser. 8. 524. Wet gravelly heaths. Per. 8.

## PRUNELLA. Self-heal.

1. *P. vulgaris*, common. 14. 961. Meadows and pastures. Per. 7, 8.

## Ord. 2. Angiospermia.

### BARTSIA. Bartfia.

1. *B. alpina*, alpine purple. 6. 361. Alpine rills. Per. 7.
2. *B. viscosa*, yellow viscid. 15. 1045. Marshes, rare. Ann. 7, 8.
3. *B. Odontites*, red. 20. 1415. Meadows and pastures. Ann. 7, 8.

### RHINANTHUS. Yellow-rattle.

1. *R. Crista-galli*, common. 10. 657. Meadows. Ann. 6.

### EUPHRASIA. Eye-bright.

1. *E. officinalis*, common. 20. 1416. Heaths and pastures. Ann. 7—9.

### MELAMPYRUM. Cow-wheat.

1. *M. cristatum*, crested. 1. 41. Fields and groves, rare. Ann. 7.
2. *M. arvense*, purple. 1. 53. Wheat fields, Norfolk. Ann. 7.
3. *M. pratense*, common. 2. 113. Groves and thickets. Ann. 7, 8.
4. *M. sylvaticum*, wood. 12. 804. Alpine woods. Ann. 7, 8.

### LATHRÆA. Tooth-wort.

1. *L. Squamaria*, greater. 1. 50. Dry woods. Per. 4.

### PEDICULARIS. Loufe-wort.

1. *P. palustris*, marsh. 6. 399. Marshy meadows. Per. 6, 7.
2. *P. sylvatica*, pasture. 6. 400. Mountain heaths. Per. 6, 7.

### ANTIRRHINUM. Snapdragon.

- \*1. *A. Cymbalaria*, ivy-leaved. 7. 502. Old walls. Per. 5—11.
2. *A. spurium*, round-leaved fluellin. 10. 691. Fields. Ann. 7—9.

3. *A. Blatine*, sharp-pointed fluellin. 10. 692. Fields. Ann. 7—9.
4. *A. repens*, creeping pale-blue toadflax. 18. 1253. Chalky hills. Per. 7—9.
5. *A. Linaria*, common yellow toadflax. 10. 658. Hedges, &c. Per. 6, 7.  
β, with regular pentandrous flowers. 4. 260. See PELORIA.
6. *A. minus*, lealt. 28. 2014. Sandy fields. Ann. 6—8.
- \*7. *A. majus*, great. 2. 129. Old walls. Per. 7, 8.
8. *A. Orontium*, lesser. 17. 1155. Sandy or chalky fields. Ann. 7, 8.

## SCROPHULARIA. Figwort.

1. *S. nodosa*, knotty-rooted. 22. 1544. Woods and hedges. Per. 7.
2. *S. aquatica*, water. 12. 854. Watery places. Per. 7.
3. *S. Scorodonia*, balm-leaved. 31. 2209. Wet hedges, rare. Per. 7, 8.
4. *S. vernalis*, yellow. 8. 567. Lanes and hedges, rare. Bienn. 4, 5.

## DIGITALIS. Fox-glove.

1. *D. purpurea*, purple. 19. 1297. Pastures and thickets. Bienn. 6, 7.

## LINNÆA. Linnæa.

1. *L. borealis*, two-flowered. 7. 433. Stony woods, Scotland, rare. Per. 6.

## SIBTHORPIA. Sibthorpia.

1. *S. europæa*, Cornish moneywort. 10. 649. Moist ground, Cornwall. Per. 7, 8.

## LIMOSELLA. Mud-wort.

1. *L. aquatica*, little. 5. 357. Muddy ground. Ann. 7, 8.

## OROBANCHE. Broom-rape.

1. *O. major*, greater. 6. 421. On broom or furze. Per. 6, 7.
2. *O. elatior*, tall. 8. 568. On various roots. Per. 7, 8.
3. *O. minor*, lesser. 6. 422. On clover roots. Ann. 7, 8.
4. *O. rubra*, red fragrant. 25. 1786. Basaltic rocks, Ireland. Per. 8.
5. *O. cærulea*, purple. 6. 423. Pastures near the sea. Per. 7.
6. *O. ramosa*, branched. 3. 184. On hemp. Ann. 8, 9.

## Class 15. TETRADYNAMIA.

### Ord. 1. Siliculosa.

#### VILLA. Cress-rocket.

1. *V. annua*, annual. 21. 1442. Sandy fields, rare. Ann. 6.

#### SUBULARIA. Awl-wort.

1. *S. aquatica*, water. 11. 732. In alpine lakes. Ann. 7.

#### DRABA. Whitlow-grafs.

1. *D. verna*, common. 9. 586. Walls and pastures. Ann. 3, 4.
2. *D. aizoides*, yellow alpine. 18. 1271. Rocks, South Wales. Per. 3.
3. *D. hirta*, simple-haired. 19. 1338. Alpine rocks. Per. 5, 6.

## PLANTS.

4. *D. incana*, twisted-podded. 6. 388. Limestone rocks. Bienn. 5, 6.  
 5. *D. muralis*, speedwell-leaved. 13. 912. Shady hills. Ann. 5.

### ALYSSUM. Alyffum.

- \* 1. *A. sativum*, gold of pleasure. 18. 1254. Fields. Ann. 6.  
 2. *A. maritimum*, sweet. 25. 1729. Sea-coast, rare. Per. 8, 9.

### LEPIDIUM. Pepper-wort.

1. *L. latifolium*, broad-leaved. 3. 182. Sea-coast. Per. 7.  
 2. *L. ruderale*, narrow-leaved. 23. 1595. Sea-coast. Bienn. 6.  
 3. *L. campestre*, mithridate. 20. 1385. (Thlaspi). Fields. Ann. 7.  
 4. *L. birtum*, hairy. 26. 1803. (Thlaspi). Fields, rare. Per. 6.

### HUTCHINSIA. Hutchinsia.

*Brown in Ait. Hort. Kew. v. 4. 82.*

Eff. Ch. Pouch entire; valves tumid. Seeds two in each cell. Filaments simple.

1. *H. petraea*, rock. 2. 111. (*Lepidium petræum*). Limestone. Bienn. 3, 4.

Leaves pinnatifid, entire. Petals shorter than the calyx. Stigma feffile.

Named, by Mr. R. Brown, in honour of Miss Hutchins, of Bantry, in Ireland; a lady whose discoveries in the most difficult parts of practical botany, well entitle her to commemoration. The genus is distinguished from *Draba* and *Subularia*, in having but two, instead of many, seeds in each cell; and moreover from the former in having tumid, not nearly flat valves; from the latter in not having linear cotyledons. *Lepidium* has properly an emarginate pouch, with keeled valves, and folitary seeds. Other species of *Hutchinsia* are *Iberis rotundifolia* and *Lepidium alpinum* of Linnæus.

### TEESDALIA. Teefeldalia.

*Brown in Ait. Hort. Kew. v. 4. 83.*

Eff. Ch. Pouch emarginate, inversely heart-shaped. Seeds two in each cell. Filaments each bearing a scale, at the inside, near the base.

1. *T. nudicaulis*, naked-stalked. 5. 327. (*Iberis nudicaulis*). Gravelly pastures. Ann. 5.

Petals equal.

This genus is dedicated, by Mr. Brown, to the memory of the late Mr. Robert Teefeldale, F.L.S. Another species is the exotic *Lepidium nudicaule* of Linnæus, differing in having equal petals, and but four stamens. See *TEESDALIA* hereafter in its proper place.

### THLASPI. Mithridate Mustard.

1. *T. arvense*, penny cress. 24. 1659. Fields, rare. Ann. 6, 7.  
 2. *T. perfoliatum*, perfoliate. 33. 2354. Limestone quarries. Ann. 4, 5.  
 3. *T. alpestre*, alpine. 2. 81. Limestone hills. Per. 6, 7.  
 4. *T. Bursa-pastoris*, shepherd's purse. 21. 1485. Common. Ann. 3—9.

### COCHLEARIA. Scurvy-grafs.

1. *C. officinalis*, common. 8. 551. Mountains, and sea-coast. Ann. 5.

2. *C. groenlandica*, Greenland. 34. 2403. Highlands. Ann. 8

3. *C. anglica*, English. 8. 552. Muddy sea shores. Ann. 5.

4. *C. danica*, Danish. 10. 696. Muddy shores, rare. Ann. 5, 6.

5. *C. Armoracia*, horse-radish. 33. 2323. Watery places. Per. 5.

### CORONOPUS. Wart-cress.

1. *C. Ruellii*, common. 24. 1660. Waste ground. Ann. 6—8.

2. *C. didyma*, lesser. 4. 248. West of England. Ann. 7.

### IBERIS. Candy-tuft.

1. *I. amara*, bitter. 1. 52. Chalky fields, rare. Ann. 7.

### ISATIS. Woad.

1. *I. tinctoria*, dyer's. 2. 97. Fields, rare. Bienn. 7.

### BUNIAS. Sea Rocket.

1. *B. Cakile*, common. 4. 231. Sandy shore. Ann. 6—9.

### CRAMBE. Kale.

1. *C. maritima*, sea. 13. 924. Sandy sea-coast. Per. 5, 6.

### Ord. 2. Siliquosa.

### DENTARIA. Coral-wort.

1. *D. bulbifera*, bulbiferous. 5. 309. Shady places, rare. Per. 4, 5.

### CARDAMINE. Ladies'-smock.

1. *C. bellidifolia*, daisy-leaved. 33. 2355. Mountains, rare. Per. 8.

2. *C. impatiens*, impatient. 2. 80. Stony mountains. Ann. 5, 6.

3. *C. hirsuta*, hairy. 7. 492. Waste and cultivated ground. Ann. 3—6.

4. *C. pratensis*, meadow. 11. 776. Meadows and pastures. Per. 4, 5.

5. *C. amara*, bitter. 14. 1000. Watery places, rare. Per. 4, 5.

### SISYMBRIUM. Rocket.

1. *S. Nasturtium*, water-cress. 12. 855. Running waters. Per. 6, 7.

2. *S. sylvestre*, creeping water. 33. 2324. Inundated gravel. Per. 6—9.

3. *S. terrestre*, annual water. 25. 1747. Watery places. Ann. 6—9.

4. *S. amphibium*, great water. 26. 1840. Rivers. Per. 6—8.

5. *S. tenuifolium*, greater wall. 8. 525. Walls and rubbish. Per. 7—10.

6. *S. murale*, spreading wall. 16. 1090. Sandy wastes. Ann. 8—10.

7. *S. monense*, dwarf sea. 14. 962. Sandy coasts, rare. Per. 6, 7.

8. *S. Sophia*, flix-weed. 14. 963. Waste ground. Ann. 7.

9. *S. Irio*, London. 23. 1631. Rubbish and walls. Ann. 7, 8.

### ERYSIMUM. Hedge-mustard.

1. *E. officinale*, common. 11. 735. Waste places, and roads. Ann. 6, 7.

## PLANTS.

2. *E. Barbarea*, bitter winter-crefs. 7. 443. Rubbifh and ditches. Per. 5—8.
3. *E. præcox*, early winter-crefs. 16. 1129. Watery places. Bienn. 4—10.
4. *E. Alliaria*, garlick. 12. 796. Hedges, common. Bienn. 5.
5. *E. cheiranthoides*, treacle. 14. 942. Fields and willow-beds. Ann. 7.

### CHEIRANTHUS. Stock.

1. *C. fruticulofus*, wall-flower. 27. 1934. Old walls. Per. 5, 6.
2. *C. incanus*, hoary shrubby. 27. 1935. Sea cliffs, rare. Shrubby. 5.
3. *C. finuatus*, fea. 7. 462. Welch coaft. Bienn. 8.

### HESPERIS. Dame's-violet.

- † 1. *H. inodora*, fcntlefs. 11. 731. Banks of rivulets, rare. Per. 5, 6.

### ARABIS. Wall-crefs.

1. *A. thaliana*, common. 13. 901. Walls and banks. Ann. 4.
2. *A. stricta*, Bristol rock. 9. 614. Rocks, Bristol. Per. 5.
3. *A. bifpida*, alpine rock. 7. 469. (Cardamine haftulata). Rocks. Per. 6, 7.
4. *A. Turritia*, tower. 3. 178. Walls, rare. Bienn. 5.

### TURRITIS. Tower-muftard.

1. *T. glabra*, fsmooth. 11. 777. Gravelly banks. Ann. 5, 6.
2. *T. hirsuta*, hairy. 9. 587. Rocks and walls. Per. 5.
3. *T. alpina*, alpine. 25. 1746. Weft of Ireland. Bienn. 7.

### BRASSICA. Cabbage.

1. *B. orientalis*, perfoliate. 26. 1804. Fields and cliffs. Ann. 6.
2. *B. campeftris*, field. 32. 2234. Fields. Ann. 6.
3. *B. Napus*, rape, or navev. 30. 2146. Fields and banks. Bienn. 5.
4. *B. Rapa*, turnep. 31. 2176. Fields. Bienn. 4.
5. *B. oleracea*, fea. 9. 637. Sea cliffs. Bienn. 5, 6.

### SINAPIS. Muftard.

1. *S. arvenfis*, charlock. 25. 1748. Fields, common. Ann. 5.
2. *S. alba*, white. 24. 1677. Fields. Ann. 6.
3. *S. nigra*, common. 14. 969. Fields and banks. Ann. 6.

### RAPHANUS. Radifh.

1. *R. Raphaniftrum*, wild. 12. 856. Corn-fields. Ann. 6, 7.
2. *R. maritimus*, fea. 23. 1643. Sea-coaft. Bienn. 6.

## Clafs 16. MONADELPHIA.

### Ord. 1. Pentandria.

#### ERODIUM. Stork's-bill.

1. *E. cicutarium*, hemlock. 25. 1768. Rubbifh and fand. Ann. 6—8.

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2. *E. moschatum*, mufty. 13. 902. Mountain pastures. Ann. 6, 7.

3. *E. maritimum*, fea. 9. 646. Sandy coaft. Per. 5—9.

### Ord. 2. Decandria.

#### GERANIUM. Crane's-bill.

1. *G. phæum*, dufty. 5. 322. Mountain thickets. Per. 5, 6.
2. *G. nodofum*, knotty. 16. 1091. Mountains, rare. Per. 5—8.
3. *G. fylvaticum*, wood. 2. 121. Mountain thickets. Per. 6, 7.
4. *G. pratense*, crowfoot-leaved. 6. 404. Hilly pastures. Per. 6, 7.
5. *G. robertianum*, ftinking. 21. 1486. Rubbifh and banks. Ann. 5—10.
6. *G. lucidum*, fhining. 2. 75. Walls and ftony places. Ann. 5—8.
7. *G. molle*, dove's-foot. 11. 778. Pastures and rubbifh. Ann. 4—8.
8. *G. pufillum*, fmall-flowered. 6. 385. Gravelly ground. Ann. 6—9.
9. *G. pyrenaicum*, mountain. 6. 405. Meadows and pastures. Per. 7.
10. *G. rotundifolium*, round-leaved. 3. 157. Gravelly banks. Ann. 6, 7.
11. *G. diffectum*, jagged-leaved. 11. 753. Barren banks. Ann. 5, 6.
12. *G. columbinum*, long-ftalked. 4. 259. Chalky banks. Ann. 6, 7.
13. *G. fanguineum*, bloody. 4. 272. Rocks and hills. Per. 7—9.

### Ord. 3. Polyandria.

#### ALTHÆA. Marsh-mallow.

1. *A. officinalis*, common. 3. 147. Sea marfhcs. Per. 7—9.

#### MALVA. Mallow.

1. *M. fylveftris*, common. 10. 671. Hedges and rubbifh. Per. 5—8.
2. *M. rotundifolia*, dwarf. 16. 1092. β. 4. 241. Rubbifh. Ann. 6—9.
3. *M. moschata*, mufk. 11. 754. Gravelly banks. Per. 7, 8.

#### LAVATERA. Tree-mallow.

1. *L. arborea*, fea. 26. 1841. Sea-coaft, rare. Bienn. 7—10.

## Clafs 17. DIADELPHIA.

### Ord. 1. Hexandria.

#### FUMARIA. Fumitory.

1. *F. folida*, folid bulbous. 21. 1471. Northern woods. Per. 4, 5.
2. *F. lutea*, yellow. 9. 588. Old walls. Per. 5.
3. *F. officinalis*, common. 9. 589. Cultivated ground. Ann. 5—8.
4. *F. parviflora*, fmall-flowered. 9. 590. Fields, in the fouth. Ann. 8, 9.
5. *F. capreolata*, ramping. 14. 943. Fields, rare. Ann. 6—9.
6. *F. claviculata*, white climbing. 2. 103. Gravelly thickets. Ann. 6, 7.

4 N

Ord. 2.

## PLANTS.

Ord. 2. *Oxandria*.

POLYGALA. Milkwort.

1. *P. vulgaris*, common. 2. 76. Sunny pastures. Per. 6, 7.

Ord. 3. *Decandria*.

SPARTIUM. Broom.

1. *S. scoparium*, common. 19. 1339. Dry hills and fields. Shrub. 5, 6.

GENISTA. Green-weed.

1. *G. tinctoria*, dyer's. 1. 44. Pastures and thickets. Shrub. 7, 8.
2. *G. pilosa*, hairy. 3. 208. Barren heaths, rare. Shrubby. 5.
3. *G. anglica*, needle. 2. 132. Moist heaths. Low shrub. 5, 6.

ULEX. Furze.

1. *U. europaeus*, common. 11. 742. Heaths and sandy downs. Shrub. 5—12.
2. *U. nanus*, dwarf. 11. 743. Elevated heaths. Shrub. 8—10.

ONONIS. Rest-harrow.

1. *O. arvensis*, common. 10. 682. Barren pastures, &c. Per. 6—8.

ANTHYLLIS. Kidney-vetch.

1. *A. vulneraria*, ladies'-finger. 2. 104. Chalky hills. Per. 6—8.

PISUM. Pea.

1. *P. maritimum*, pea. 15. 1046. Stony sea beach. Per. 7.

OROBUS. Bitter-vetch.

1. *O. tuberosus*, heath. 17. 1153. Heaths and thickets. Per. 5, 6.
2. *O. sylvaticus*, wood. 8. 518. Mountain woods. Per. 5, 6.

LATHYRUS. Lathyrus.

1. *L. Aphaca*, yellow vetchling. 17. 1167. Gravelly banks, rare. Ann. 6—8.
2. *L. Nissolia*, crimson grassy. 2. 112. Bushy places. Ann. 5.
3. *L. hirsutus*, rough-podded. 18. 1255. Fields, rare. Ann. 7.
4. *L. pratensis*, yellow meadow. 10. 670. Meadows and pastures. Per. 7, 8.
5. *L. sylvestris*, narrow-leaved. 12. 805. Moist thickets. Per. 7, 8.
6. *L. latifolius*, broad-leaved. 16. 1108. Woods, rare. Per. 7, 8.
7. *L. palustris*, marsh. 3. 169. Wet thickets. Per. 7, 8.

VICIA. Vetch.

1. *V. sylvatica*, wood. 2. 79. Mountain thickets. Per. 7, 8.
2. *V. Cracca*, tufted. 17. 1168. Meadows and hedges. Per. 7, 8.
3. *V. sativa*, common. 5. 334. Fields and grassy places. Ann. 5, 6.
4. *V. lathyroides*, spring. 1. 30. Gravelly fields. Ann. 4, 5.
5. *V. lutea*, rough-podded yellow. 7. 481. Stony beach. Per. 8.

6. *V. hybrida*, hairy-flowered yellow. 7. 482. Fluckets, rare. Per. 6.

7. *V. levigata*, smooth-podded pea. 7. 483. Stony beach, rare. Per. 8.

8. *V. sepium*, bush. 22. 1515. Bushy places, common. Per. 5, 6.

9. *V. bithynica*, rough-podded purple. 26. 1842. Pastures, rare. Per. 7, 8.

ERVUM. Tare.

1. *E. tetraspermum*, smooth. 17. 1223. Moist fields. Ann. 6.

2. *E. hirsutum*, hairy. 14. 970. Fields and meadows. Ann. 6.

ORNITHOPUS. Bird's-foot.

1. *O. perpusillus*, common. 6. 369. Gravel or sand. Ann. 5.

HIPPOCREPIS. Horse-shoe-vetch.

1. *H. comosa*, tufted. 1. 31. Chalky hills. Per. 5—8.

HEDYSARUM. Saint-foin.

1. *H. Onobrychis*, common. 2. 96. Chalky hills. Per. 6, 7.

ASTRAGALUS. Milk-vetch.

1. *A. glycyphyllos*, sweet. 3. 203. Chalky thickets. Per. 6.

2. *A. hypoglottis*, purple mountain. 4. 274. Chalk or sand. Per. 6, 7.

3. *A. uralensis*, hairy mountain. 7. 466. Scottish hills. Per. 7.

4. *A. campestris*, yellowish mountain. 36. 2522. Highlands. Per. 7.

TRIFOLIUM. Trefoil.

1. *T. officinale*, melilot. 19. 1340. Bushy places. Ann. 6, 7.

2. *T. ornithopodioides*, bird's-foot. 15. 1047. Gravelly heaths. Ann. 6, 7.

3. *T. repens*, white clover. 25. 1769. Meadows, common. Per. 5—9.

4. *T. subterraneum*, subterranean. 15. 1048. Gravelly pastures. Ann. 5.

5. *T. oebroleucum*, sulphur-coloured. 17. 1224. Dry pastures. Per. 6, 7.

6. *T. pratense*, common purple clover. 25. 1770. Meadows and pastures. Per. 5—9.

7. *T. medium*, zigzag. 3. 190. Chalky or gravelly pastures. Per. 7.

8. *T. maritimum*, teal-headed. 4. 220. Muddy sea shore. Ann. 6, 7.

9. *T. stellatum*, starry-headed. 22. 1545. South coast. Ann. 7.

10. *T. arvense*, hare's-foot. 14. 944. Sandy fields. Ann. 7, 8.

11. *T. scabrum*, rough. 13. 903. Chalk or sand. Ann. 5, 6.

12. *T. glomeratum*, round-headed. 15. 1063. Gravelly pastures. Ann. 6.

13. *T. striatum*, soft knotted. 26. 1843. Barren ground. Ann. 6.

14. *T. suffocatum*, suffocated. 15. 1049. Sea sand. Ann. 6, 7.

15. *T. fragiferum*, strawberry-headed. 15. 1050. Moist pastures. Per. 7, 8.

16. *T. procumbens*, hop. 14. 945. Dry gravelly pastures. Ann. 6, 7.

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17. *T. minus*, lesser yellow. 18. 1256. Gravelly ground. Ann. 6, 7.  
 18. *T. filiforme*, slender yellow. 18. 1257. Moist gravel. Ann. 6, 7.

LOTUS. Bird's-foot Trefoil.

1. *L. corniculatus*, common. 30. 2090. Pastures, common. Per. 6—8.  
 2. *L. major*, greater. 30. 2091. Wet bushy places. Per. 7, 8.  
 3. *L. diffusus*, slender. 13. 925. Rocks, fourth coast. Per? 5, 6.

MEDICAGO. Medick.

- \*1. *M. sativa*, purple, or lucerne. 25. 1749. Meadows and pastures. Per. 6, 7.  
 2. *M. falcata*, yellow. 15. 1016. Gravelly and chalky banks. Per. 7.  
 3. *M. lupulina*, black. 14. 971. Meadows and pastures. Ann. 5—8.  
 4. *M. maculata*, spotted. 23. 1616 (polymorpha). Gravelly banks. Ann. 5, 6.  
 5. *M. muricata*, flat-toothed. Pluk. Phyt. t. 113. f. 6. Suffolk coast. Ann. 6.  
 6. *M. minima*, little bur. Fl. Dan. t. 211. Chalky ground. Ann. 6.

Class 18. POLYADELPHIA.

Ord. 1. Polyandria.

HYPERICUM. St. John's-wort.

1. *H. calycinum*, large-flowered. 29. 2017. Thickets, Ireland. Shrubby. 7—9.  
 2. *H. Androsæmum*, tutfan. 18. 1225. Woods, rare. Per. 7, 8.  
 3. *H. quadrangulum*, square. 6. 370. Moist meadows. Per. 7, 8.  
 4. *H. perforatum*, perforated. 5. 295. Bushy places. Per. 7, 8.  
 5. *H. dubium*, imperforate. 5. 296. Mountain thickets. Per. 7, 8.  
 6. *H. humifusum*, trailing. 18. 1226. Pastures and groves. Per. 7.  
 7. *H. montanum*, mountain. 6. 371. Bushy hills. Per. 7.  
 8. *H. barbatum*, bearded. 28. 1986. Thickets, Scotland. Per. 9, 10.  
 9. *H. hirsutum*, hairy. 17. 1156. Chalky banks. Per. 6, 7.  
 10. *H. pulchrum*, small upright. 18. 1227. Clay heaths. Per. 7.  
 11. *H. elodes*, marsh. 2. 109. Spongy bogs. Per. 7, 8.

Class 19. SYNGENESIA.

Ord. 1. Polygamia æqualis.

TRAGOPOGON. Goat's-beard.

1. *T. pratensis*, yellow. 7. 434. Grassy pastures. Bienn. 6.  
 2. *T. porrifolius*, purple. 9. 638. Moist meadows, rare. Bienn. 5, 6.

PICRIS. Ox-tongue.

1. *P. echioides*, brittle. 14. 972. Clay pastures and banks. Ann. 6, 7.

2. *P. hieracioides*, hawkweed. 3. 196. Gravel or chalk. Bienn. 7, 8.

SONCHUS. Sow-thistle.

1. *S. ceruleus*, blue. 34. 2425. Highland pastures, rare. Per. 7, 8.  
 2. *S. palustris*, tall marsh. 13. 935. Banks of rivers. Per. 7, 8.  
 3. *S. arvensis*, corn. 10. 674. Corn-fields, on clay. Per. 8.  
 4. *S. oleraceus*, common. 12. 843. Fields, banks, and rubbish. Ann. 7—9.

LACTUCA. Lettuce.

1. *L. virofa*, strong-scented. 28. 1957. Chalky banks. Bienn. 8, 9.  
 2. *L. Scariola*, prickly. 4. 268. Rubbish, rare. Bienn. 8.  
 3. *L. saligna*, leaf. 10. 707. Chalky banks. Bienn. 8.

PRENANTHES. Wall-Lettuce.

1. *P. muralis*, ivy-leaved. 7. 457. Walls, or chalky groves. Per. 7.

LEONTODON. Dandelion.

1. *L. Taraxacum*, common. 8. 510. Meadows and pastures. Per. 4—7.  
 2. *L. palustre*, marsh. 8. 553. Moist meadows. Per. 6, 7.

APARGIA. Hawkbit.

*Schreb.* 527. *Willd. Sp. Pl.* v. 3. 1547. *Sm. Prodr. Fl. Græc. Sibth.* v. 2. 130. *Ait. Hort. Kew.* v. 4. 445.

Hedynois; *Hudf.* 340. *Sm. Fl. Brit.* 823.  
 Eff. Ch. Receptacle naked, dotted. Calyx imbricated. Seed-down feathery, sessile, unequal.

1. *A. hispida*, rough. 8. 554. (Hedynois hispida). Chalky pastures. Per. 7.  
 Stalks radical, single-flowered. Leaves toothed, rough. Florets hairy at the orifice, glandular at the extremity.

2. *A. hirta*, deficient. 8. 555. (*H. hirta*). Gravelly pastures. Per. 7, 8.

Stalks radical, single-flowered. Leaves toothed, rough. Calyx nearly smooth. Outer row of seeds naked.

3. *A. Taraxici*, alpine. 16. 1109. (*H. Taraxici*). Alpine rills. Per. 8.

Stalks radical, mostly single-flowered. Leaves with reversed teeth, smooth. Calyx hairy.

4. *A. autumnalis*, autumnal. 12. 830. (*H. autumnalis*). Pastures. Per. 8.

Stalk radical, branched; subdivisions scaly. Leaves lanceolate, smoothish; toothed or pinnatifid.

Willdenow has, in all, 17 species of this genus, among which are *Leontodon alpinum*, Jacq. Austr. t. 93; *L. basilæ*, Linn. Sp. Pl. 1123; *L. tuberosum*, ibid: *Hieracium incanum*, Jacq. Austr. t. 287; *Leontodon crispum*, Villars Dauph. v. 3. 84. t. 25; *L. coronopifolium*, Desfont. Atlant. v. 2. 229. t. 214; and *L. hispidum*, Cavan. Ic. t. 149; the latter named *Apargia hispanica*, Willd. n. 14. See HEDYNOIS.

HIERACIUM. Hawkweed.

1. *H. alpinum*, alpine single-flowered. 16. 1110. Alpine rocks. Per. 7.  
 2. *H. Pilosella*, mouse-ear. 16. 1093. Pastures and walls. Per. 5—7.  
 3. *H. dubium*, branching mouse-ear. 33. 2332. Hills, rare. Per. 7, 8.  
 †4. *H. Auricula*, orange mouse-ear. 33. 2368. Mountains? Per. 7, 8.

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5. *H. aurantiacum*, great orange. 21. 1469. Woods, Scotland. Per. 6, 7.
6. *H. murorum*, wall. 29. 2082. Rocks and walls. Per. 6.
7. *H. maculatum*, stained-leaved. 30. 2121. Mountain rocks. Per. 6.
8. *H. sylvaticum*, wood. 29. 2031. Rocks and walls, common. Per. 6, 7.
9. *H. pulmonarium*, lungwort. 33. 2307. Rocks, Scotland. Per. 7.
10. *H. Larousii*, glaucous hairy. 29. 2083. North of England. Per. 7.
11. *H. paludosum*, fucory-leaved mountain. 16. 1094. Mountain rills. Per. 7.
12. *H. molle*, soft-leaved. 31. 2210. Woods, Scotland. Per. 7, 8.
13. *H. cerinthoides*, honeywort-leaved. 34. 2378. Rocks, Scotland. Per. 8.
14. *H. villosum*, shaggy alpine. 34. 2379. Highlands. Per. 8.
15. *H. sabaudum*, shrubby broad-leaved. 5. 349. Groves. Per. 8, 9.
16. *H. denticulatum*, small-toothed. 30. 2122. Woods, Scotland. Per. 8, 9.
17. *H. prenanthoides*, rough-bordered. 32. 2235. Woods, Scotland. Per. 8.
18. *H. umbellatum*, narrow-leaved. 25. 1771. Stony groves. Per. 8, 9.

### CREPIS. Hawk's-beard.

1. *C. fetida*, stinking. 4. 406. Chalky pastures, rare. Bienn. 6, 7.
2. *C. pulchra*, small-flowered. 33. 2325. Rocks, Scotland. Ann. 6—9.
3. *C. tetorum*, smooth. 16. 1111. Pastures and rubbif. Ann. 6—9.
4. *C. biennis*, rough. 3. 149. Chalky pastures. Bienn. 6, 7.

### HYPOCHÆRIS. Cat's-ear.

1. *H. maculata*, spotted. 4. 225. Chalky downs. Per. 7.
2. *H. glabra*, smooth. 8. 575. Gravelly fields. Ann. 6—8.
3. *H. radicata*, long-rooted. 12. 831. Meadows and pastures. Per. 6—8.

### LAPSANA. Nipple-wort.

1. *L. communis*, common. 12. 844. Fields and rubbif. Ann. 6, 7.
2. *L. pusilla*, little. 2. 95. (*Hyoseris minima*). Gravelly fields. Ann. 6.

Stem nonc. Stalks subdivided; swelling and hollow at the summit. Leaves obovate. The seeds have an elevated border, which is unlike the true *Lapsana*, but this plant is perhaps better placed here than elsewhere. See LAPSANA.

### CICHORIUM. Succory.

1. *C. Intybus*, wild. 8. 539. Gravel or chalk. Per. 7, 8.

### ARCTIUM. Bur-dock.

1. *A. Lappa*, common. 18. 1228. Waste places. Bienn. 7, 8.
2. *A. Bardana*, woolly-headed. 35. 2478. Waste hilly ground. Bienn. 7, 8.

### SERRATULA. Saw-wort.

1. *S. tinctoria*, common. 1. 38. Groves and thickets. Per. 7, 8.
2. *S. alpina*, alpine. 9. 599. Alpine rocks. Per. 7, 8.

### CARDUUS. Thistle.

1. *C. nutans*, musk. 16. 1112. Gravelly or chalky fields. Ann. 7, 8.
2. *C. acanthoides*, curled or welted. 14. 973. Waste ground. Ann. 6, 7.
3. *C. tenuiflorus*, slender-flowered. 6. 412. Banks, rare. Ann. 6, 7.
4. *C. marianus*, milk. 14. 976. Banks and hedges. Ann. 8.

### CNICUS. Plume-thistle.

1. *C. lanceolatus*, spear. 2. 107. (*Carduus lanceolatus*). Banks. Bienn. 6—9.
2. *C. palustris*, marsh. 14. 974. (*Card. palustris*). Moist pastures. Bienn. 7, 8.
3. *C. arvensis*, creeping. 14. 975. (*Card. arvensis*). Fields and roads. Per. 7.
4. *C. eriophorus*, woolly-headed. 6. 386. (*Card. erioph.*) Chalk or gravel. Bienn. 8.
5. *C. tuberosus*, tuberous. 36. 2562. Woods, Wiltshire. Per. 8.
6. *C. heterophyllus*, melancholy. 10. 675 (*Card. neteroph.*) Mountain pastures. Per. 7, 8.
7. *C. pratensis*, meadow. 3. 177 (*Card. prat.*) Moist pastures. Per. 6.
8. *C. acaulis*, dwarf. 3. 161 (*Card. acaulis*). Gravel or chalk. Per. 7, 8.

### ONOPORDUM. Cotton-thistle.

1. *O. Acanthium*, common. 14. 977. Gravelly banks. Bienn. 7.

### CARLINA. Carlina-thistle.

1. *C. vulgaris*, common. 16. 1144. Dry sandy fields. Bienn. 6.

### BIDENS. Bur-marygold.

1. *B. tripartita*, trifid. 16. 1113. Ditches and puddles. Ann. 8, 9.
2. *B. cernua*, nodding. 16. 1114. Watery places. Ann. 9.

### EUPATORIUM. Hemp-agrimony.

1. *E. cannabinum*, common. 6. 428. Watery boggy places. Per. 7, 8.

### CHRYSOCEMA. Goldy-locks.

1. *C. Linosyris*, flax-leaved. 35. 2505. Sea cliffs, Devonshire. Per. 9.

### SANTOLINA. Cotton-weed.

1. *S. maritima*, sea. 2. 141. Sandy beach, rare. Per. 8, 9.

### Ord. 2. *Polygamia-superflua*.

### TANACETUM. Tanfy.

1. *T. vulgare*, common. 18. 1229. Hills and way sides. Per. 7, 8.

### ARTEMISIA.

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## ARTEMISIA. Mugwort.

1. *A. campestris*, field southernwood. 5. 338. Sandy fields, rare. Per. 8.
2. *A. maritima*, drooping sea wormwood. 24. 1706. Muddy sea shore. Per. 8.
3. *A. gallica*, upright sea wormwood. 14. 1001 (maritima). Muddy shores. Per. 8. Radical leaves capillary. Clusters erect.
4. *A. Absinthium*, common wormwood. 18. 1230. Rubbif. Per. 8.
5. *A. vulgaris*, common. 14. 978. Waste ground, hedges, &c. Per. 8.
- †6. *A. cerulefcens*, blueifh. 34. 2426. Sea shore, Lincolnshire. *Hudfon.* Per. 8.

## GNAPHALIUM. Cudweed.

1. *G. luteo-album*, Jerfey. 14. 1002. Sandy ground, Jerfey. Ann. 7, 8.
2. *G. margaritaceum*, American. 29. 2018. Meadows, rare. Per. 8.
3. *G. dioicum*, mountain. 4. 267. Dry mountain pastures. Per. 6, 7.
4. *G. fylvaticum*, Highland. 13. 913. Alpine pastures. Per. 8.
5. *G. reftum*, upright wood. 2. 124. Sandy thickets. Per. 8.
6. *G. fupinum*, dwarf. 17. 1193. Micaceous mountains. Per. 7.
7. *G. uliginofum*, marfh. 17. 1194. Sandy puddles. Ann. 8.
8. *G. gallicum*, narrow-leaved. 33. 2369. Gravelly fields, rare. Ann. 7, 8.
9. *G. minimum*, leaf. 17. 1157. Barren gravelly fields. Ann. 7.
10. *G. germanicum*, common. 14. 946. Gravelly fields. Ann. 7, 8.

## CONYZA. Spikenard.

1. *C. fquarrofa*, plowman's. 17. 1195. Calcareous pastures. Bienn. 7, 8.

## ERIGERON. Flea-bane.

- \*1. *E. canadefe*, Canada. 29. 2019. Fields and rubbish. Ann. 8, 9.
  2. *E. acre*, blue. 17. 1158. Dry gravelly ground. Bienn. 7, 8.
  3. *E. alpinum*, alpine. 7. 464. Alpine rills, Scotland. Per. 7.
  4. *E. uniflorum*, pale mountain. 34. 2416. Highlands. Per. 7.
- Stems mottly fingle-flowered. Calyx hairy. Florets of the radius erect, fomewhat tubular.

## TUSSLAGO. Colt's-foot.

1. *T. Farfara*, common. 6. 429. Moift chalk. Per. 3, 4.
2. *T. hybrida*, tall butter-bur. 6. 430. Moift meadows, rare. Per. 4.
3. *T. Petafites*, common butter-bur. 6. 431. Moift meadows. Per. 4.

## SENECIO. Ragwort.

1. *S. vulgaris*, common groundfel. 11. 747. Fields and rubbish. Ann. 3—10.
2. *S. vifcofus*, flinking. 1. 32. Chalky banks, rare. Ann. 7—10.

3. *S. lividus*, green-fcaled. 35. 2515. Barren heaths. Ann. 9, 10.
4. *S. fylvaticus*, mountain. 11. 748. Gravelly thickets. Ann. 7, 8.
5. *S. fqualidus*, inelegant. 9. 600. Walls, Oxford. Ann. 6—10.
6. *S. tenuifolius*, hoary. 8. 574. Chalky hedges. Per. 7, 8.
7. *S. Jacobea*, common. 16. 1130. Pastures and meadows. Per. 7, 8.
8. *S. aquaticus*, marfh. 16. 1131. Marfhes. Per. 7, 8.
9. *S. paludofus*, fen. 10. 650. Fens, rare. Per. 6, 7.
10. *S. faracenicus*, broad-leaved. 31. 2211. Moift hills. Per. 7, 8.

## ASTER. Star-wort.

1. *A. Tripolium*, fea. 2. 87. Muddy fea ditches. Per. 8, 9.

## SOLIDAGO. Golden-rod.

1. *S. Virgaurea*, common. 5. 301. Groves and heaths. Per. 7—9.

## INULA. Inula.

1. *I. Helenium*, elecampane. 22. 1546. Moift pastures, rare. Per. 7, 8.
2. *I. dyfenterica*, common fleabane. 16. 1115. Watery places. Per. 8.
3. *I. pulicaria*, fmall fleabane. 17. 1196. Sandy puddles. Ann. 9.
4. *I. crithmoides*, famphire-leaved. 1. 68. Muddy falt-marfhes. Per. 8.

## CINERARIA. Flea-wort.

1. *C. paluftris*, marfh. 3. 151. Ditches and bogs. Per. 6, 7.
2. *C. integrifolia*, mountain. 3. 152. Chalky hills. Per. 5—7.

## DORONICUM. Leopard's-bane.

1. *D. Pardalianches*, great. 9. 630. Mountain pastures, rare. Per. 5.

## BELLIS. Daify.

1. *B. perennis*, common. 6. 424. Pastures. Per. 3—12.

## CHIRYSANTHEMUM. Ox-eye.

1. *C. Leucanthemum*, great white. 9. 601. Pastures and fields. Per. 6, 7.
2. *C. fegetum*, yellow corn. 8. 540. Cultivated fields. Ann. 6—8.

## PYRETHRUM. Feverfew.

1. *P. Parthenium*, common. 18. 1231. Rubbifh. Per. 6, 7.
2. *P. inodorum*, corn. 10. 676. Gravelly fields. Ann. 8, 9.
3. *P. maritimum*, fea. 14. 979. Sea-coaft, rare. Per. 7.

## MATRICARIA. May-weed.

1. *M. Chamomilla*, wild chamomile. 18. 1232. Fields and dunghills. Ann. 5—7.

## ANTHEMIS. Chamomile.

1. *A. maritima*, fea. 33. 2370. Stony beach, rare. Ann. 7.
2. *A. nobilis*, common. 14. 980. Gravelly pastures. Per. 8, 9.

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3. *A. arvensis*, corn. 9. 602. Gravelly fields. Ann. or Bienn. 6, 7.
4. *A. Cotula*, stinking. 25. 1772. Fields, common. Ann. 6, 7.
5. *A. tinctoria*, ox-eye. 21. 1472. Stony banks, rare. Per. 7, 8.

### ACHILLEA. Yarrow.

1. *A. Ptarmica*, goose-tongue. 11. 757. Moist bushy places. Per. 7, 8.
2. *A. ferrata*, ferrated. 36. 2531. Derbyshire. Per. 8. Leaves linear-lanceolate, sessile, downy, deeply ferrated; lacinated at the base. Corymbs nearly simple. Fragrant; the flowers smaller than those of *Ptarmica*, and yellowish.
3. *A. Millefolium*, common. 11. 758. Pastures, common. Per. 6—8.
4. *A. tomentosa*, woolly yellow. 36. 2532. Pastures, Scotland and Ireland. Per. 8.

### Ord. 3. *Polygamia-frustranea*.

#### CENTAUREA. Knapweed.

1. *C. Jacea*, brown radiated. 24. 1678. Pastures, Suffex and Ireland. Per. 8, 9.
2. *C. nigra*, black leffer. 4. 278. Pastures, every where. Per. 6—8.
3. *C. Cyanus*, blue-bottle. 4. 277. Corn-fields, common. Ann. 7, 8.
4. *C. Scabiosa*, greater. 1. 56. Borders of fields. Per. 7, 8.
5. *C. Isnardi*, Jersey. 32. 2256. Pastures, Jersey. Per. 7, 8.
6. *C. Calcitrapa*, red star-thistle. 2. 125. Gravelly sandy ground. Ann. 7, 8.
7. *C. foliitialis*, yellow star-thistle. 4. 243. Fields, rare. Ann. 7, 8.

### Class 20. \*GYNANDRIA.

#### Ord. 1. *Monandria*.

The natural family of the *Orchideæ*, of which this order entirely consists, has lately received some fresh corrections from the able pen of Mr. R. Brown, given by Mr. Aiton in his new edition of the Hortus Kewensis, v. 5, class *Gynandria*. By these we have profited in the following arrangement, where we have adopted several of Mr. Brown's new genera; only deriving their distinctions from characters somewhat different from his. It is a strong proof of the validity of such genera, that they will stand this test. We exclude the marks taken from the absence, presence, or number, of the minute pouches whence the masses of pollen originate; not so much on account of the difficulty of having recourse to those parts in practice, but because the distinctions founded thereon do not appear to lead to the knowledge of natural genera. On the contrary, they rather shew the danger of taking any technical character as an infallible guide throughout. We have therefore not adopted the *Gymnadenia*, nor the *Habenaria* of this ingenious writer, because they seem to us naturally to belong to *Orchis*. Nevertheless, we readily submit our opinion to the correction of those who, on mature enquiry, may think otherwise. What is to become of Willdenow's *HABENARIA*, see that article, must be decided by the future study of exotic *Orchideæ*, scarcely known sufficiently at present, to any European botanist, to enable him to form an opinion. See

## ORCHIDÆE, ORCHIS, OPHIRYS, NEOTTIA, EPIPACTIS and MALAXIS.

The *Orchideæ* are disposed in three very natural sections, which give the leading distinctions of the genera. 1st. Anther united to, or rather a continuation of, the column; terminal, in a manner, though sometimes surmounted by a point. 2d. Anther parallel to the stigma, and opposite to that part. 3d. Anther a terminal vertical moveable lid, either permanent or deciduous. Mr. Brown subdivides this third section, according to the anther being permanent or not, which seems to us unnecessary.

### Section 1.

#### ORCHIS. Orchis.

Ess. Ch. Nectary with a posterior spur.

1. *O. bifolia*, butterfly. 1. 22. Woods, especially on chalk. Per. 6.

Bulbs undivided. Lip of the nectary lanceolate, entire; spur very long. Lateral calyx-leaves spreading, deflexed. This is referred to *Habenaria* by Mr. Brown, because the masses of pollen originate from two distant glands, which are naked, or destitute of a pouch at the base. The flowers are snow-white, with some touches of green, and smell powerfully, in an evening only, like a very sweet honey-suckle.

2. *O. pyramidalis*, pyramidal. 2. 110. Chalky pastures. Per. 7.

Bulbs undivided. Lip of the nectary in three equal entire segments, with two prominences above; spur elongated, thread-shaped. This and the six following, having the gland, or glands, of their masses of pollen enclosed in a single pouch, belong to the true genus of *Orchis*. *Br.*

The flowers of *O. pyramidalis* are crimson, fragrant, composing a short, dense, pyramidal spike.

3. *O. Morio*, meadow. 29. 2059. Moist pastures. Per. 5, 6.

Bulbs undivided. Lip of the nectary four-cleft, crenate; spur obtuse, ascending. Calyx many-ribbed.

Leaves without spots. Flowers purple or crimson. The three calyx-leaves cohere together, in the form of a hood, and are ribbed with green.

4. *O. mascula*, early purple. 9. 631. Meadows and groves. Per. 4, 5.

Bulbs undivided. Lip of the nectary four-cleft, crenate; spur obtuse. Lateral calyx-leaves reflexed upward.

The leaves are spotted with black. Flowers purple, scentless. Calyx-leaves with only three ribs, of their own colour. The stalk, bractes, and germen are purple.

5. *O. ustulata*, dwarf. 1. 18. Chalky hills. Per. 6.

Bulbs undivided. Lip of the nectary four-cleft, rough, with prominent points; spur obtuse, one-third the length of the germen.

Three inches high. Calyx almost black. Lip purple, with entire lobes. Flowers small.

6. *O. militaris*, narrow-lipped military. 27. 1873. Chalk hills. Per. 5.

Bulbs undivided. Lip of the nectary five-cleft, rough; segments linear. Calyx and petals taper-pointed, confluent.

A foot high. Leaves light green, unspotted. Flowers rose-coloured, their calyx paler, or whitish. This whole plant, like the following, while drying, exhales a powerful scent of melilot, woodruff, or new hay.

7. *O. fusca*, broad-lipped military. 1. 16. (*O. militaris*). Chalk hills. Per. 5.

# PLANTS.

Bulbs undivided. Lip of the nectary five-cleft, rough; segments dilated. Calyx-leaves confluent. Petals linear.

Larger. Calyx dark brown externally. Petals and nectary pink or purple.

8. *O. hircina*, lizard. 1. 34. (*Satyrium hircinum*).

Thickets on chalk hills, very rare. Per. 7.

Bulbs undivided. Lip of the nectary three-cleft, downy; middle segment extremely long, linear, twisted, emarginate.

Largest and scarcest. British plant of this tribe, often a yard high, with from twenty to sixty flowers, whose smell is fetid, and goat-like. Spur shortish, green, like the calyx and anther. Lip two inches long, purplish-lead-coloured, with a white speckled downy disk.

9. *O. albida*, white mountain. 8. 505. (*Satyr. albidum*).

Hills. Per. 6.

Bulbs clustered, in three pairs. Lip of the nectary in three deep acute segments; spur one-third the length of the germen.

A foot high, slender. Flowers small, numerous, in a dense spike, white, with a green lip, nearly inodorous.—This and the next are made *Habenaria* by Mr. Brown.

10. *O. viridis*, green frog. 2. 94. (*Satyr. viride*).

Meadows. Per. 6, 7.

Bulbs clustered. Lip of the nectary linear, with three terminal teeth; the middle one smallest; spur very short, emarginate.

Five inches high. Flowers green, shorter than their bracteas. Lip brownish.

11. *O. latifolia*, marsh. 33. 2308. Wet meadows.

Per. 5, 6.

Bulbs clustered. Lip of the nectary crenate, obscurely three-cleft; spur conical. Bracteas longer than the flowers.

Stem hollow. Leaves unspotted. Flowers crimson, more or less deeply coloured.

12. *O. maculata*, spotted palmate. 9. 632. Pastures and groves. Per. 6, 7.

Bulbs palmate, spreading. Lip of the nectary crenate, three-lobed; spur cylindrical, shorter than the germen.

More slender. Stem solid. Leaves spotted. Flowers white, stained and dotted with violet.

13. *O. conopsea*, aromatic. 1. 10. Meadows and pastures. Per. 6.

Bulbs palmate. Lip of the nectary in three entire segments; spur bristle-shaped, twice as long as the germen.

Leaves narrow, unspotted. Flowers rather small, crimson, with a rich spicy odour.

This species alone constitutes Mr. Brown's genus of *Gymnadenia*, so called from *γυμνος*, naked, and *αδην*, a gland, because the glands supporting the masses of pollen are naked, or destitute of a pouch, and stand close together. In this last character alone the genus is made to differ from *Habenaria*, whose naked glands are more or less distant from each other. It seems to us that *Habenaria nigra*, this *Gymnadenia*, and *Orchis pyramidalis*, are so nearly akin, that no assumed character ought to separate them, and that they all truly belong to the genus *Orchis*.

## ACERAS. Man-Orchis.

*Brown in Ait. Hort. Kew. v. 5. 191.*

Eff. Ch. Calyx converging. Nectary plane, without a spur.—This genus of Mr. Brown's, whose name expresses the want of a spur, is well distinguished by that character from *Orchis*, with which it agrees in having one common pouch for the glands of the pollen. By this last mark

Mr. Brown distinguishes it, on the other hand, from the true *Ophrys*, of which we shall presently speak. We readily admit the genus, as a most natural one, only preferring the more easy characters taken from the shape of the lip, and posture of the calyx.

1. *A. anthropophora*, green. 1. 29. (*Ophrys anthropophora*). Chalk. Per. 6.

Lip of the nectary longer than the germen. Br.

The bulbs are globose. Leaves unspotted. Spike rather long, of numerous scentless flowers, whose closed calyx is green, mostly bordered with brown. Lip long, dependent, yellow, without spots; its segments four, shaped like those of the *Orchis militaris*, but generally without the small intermediate tooth.

## HERMINIUM. Musk-Orchis.

*Brown in Ait. Hort. Kew. v. 5. 191.*

Eff. Ch. Calyx spreading. Petals three-lobed, shaped like the nectary, which has no spur.

This genus, and its name, are revived from the early works of Linnæus. The application of the latter, derived, as it seems, from *ἔγυα* or *ἔγυμν*, a basis, or foundation, is not evident to us. The glands of the pollen are naked and distinct, so that it differs from *Habenaria* of Mr. Brown, as his *Aceras* does from *Orchis*, in the want of a spur. We most readily adopt the genus, only preferring, instead of a character derived from the glands, the striking one of the three-lobed petals, and their uniformity with the lip, the very same uniformity which characterises the West Indian orchideous genus of *Stelis*.

1. *H. monorchis*, small. 1. 71. (*Ophrys monorchis*).

Chalk hills. Per. 6.

Leaves radical, two, lanceolate. Br.

Three inches high. Bulbs round, one of them remote. Leaves light green. Flowers small, pale yellow, musky.

## OPHRYS. Insect-Orchis.

Eff. Ch. Calyx spreading. Nectary convex, without a spur.

See the article *OPHRYS*, where we have given Mr. Brown's characters of this most natural genus. We wish to strengthen, not to invalidate them, by those which, in conformity to our plan, we have taken from the position of the calyx, and shape of the lip. See *ACERAS* just mentioned.

1. *O. muscifera*, fly. 1. 64. Chalky pastures, sparingly. Per. 6.

Lip of the nectary four-lobed, elongated, somewhat downy; its disk polished. Column obtuse.

Bulbs ovate. Stem a foot high. Leaves unspotted. Spike lax. Calyx green. Petals linear, of a dull deep purple. Lip of the same colour, with a blueish, shining, broad, transverse stripe in the middle. The column has no terminal point.

2. *O. apifera*, bee. 6. 383. Chalky pastures. Per. 7.

Lip of the nectary five-cleft, inflated; its small terminal segment awl-shaped, recurved. Column with a hooked point.

Rather larger, with broader leaves. Flowers much larger. Calyx pale purple, with green ribs. Petals oblong, green, fringed with white. Lip resembling the body of a bee, very prominent and convex, hairy, elegantly variegated with brown and yellow; its margin bent backward, the little terminal point only being recurved forward.

3. *O. aranifera*, spider. 1. 65. Chalk-pits. Per. 4.

Lip

## PLANTS.

Lip of the nectary villous, three-lobed, emarginate, pointed, deflexed. Column acute.

Of more humble growth than the last, with a green calyx, and yellowish-green petals. The lip is like the body of a spider, brown, with two principal longitudinal paler stripes, the margin pale, and bent backward, destitute of the pointed appendage seen in the *apifera*.

The *O. arachnoides*, Andr. Repos. t. 470, a native of Italy and Switzerland, not yet observed in Britain, is a very distinct species from all these. Haller has figured it in his *Historia*, t. 24, by the name of *Orchis fuciflora*; but his account and synonyms are much confused. Andrews confounds it with our *aranifera*, which is Curtis's *fucifera*, not *fuciflora*. Its character consists in the smallness of the reddish petals, which are not one-third the size of the white calyx-leaves; and especially in the margin of the very broad lip being dilated, and, as well as the pointed appendage, reflexed. This species is omitted in *Hort. Kew.* We have received it long ago from the garden of John Walker, esq. of Arno's grove, Southend.

### Section 2.

#### NEOTTIA. Lady's Traces.

Eff. Ch. Calyx converging, embracing with its base the nectary, which has no spur. Petals converging. Column without a border. See NEOTTIA.

1. *N. spiralis*, spiral. 8. 541. (*Ophrys spiralis*.) Pastures. Per. 8, 9.

2. *N. repens*, creeping. 5. 289. (*Satyrium repens*.) Alpine woods. Per. 7.

This last is made a distinct genus by Mr. Brown, on account of a pouch under the lip; and named *Goodyera*, after the venerable and accurate contributor to the second edition of Gerarde's herbal. We lament that we are not sufficiently satisfied of its difference from *Neottia*; to which it is in habit too strictly allied, in our opinion, to be separated by the character above-mentioned.

Our *N. pubescens*, n. 17, is another species of Mr. Brown's *Goodyera*.

#### LISTERA. Tway-blade.

*Brown in Ait. Hort. Kew. v. 5. 201.*

Eff. Ch. Calyx spreading. Nectary without a spur, not embraced by the calyx. Petals spreading. Column without a border.

A very distinct genus, separated from the *Ophrys* of Linnaeus, and from the *Epipactis* of Swartz and his followers. (See *EPIPACTIS*, n. 10 and 11.) This genus is named in memory of Dr. Martin Lister, the celebrated conchologist, whose papers in the Philosophical Transactions, relating to the vascular system of plants, and the seeds of mushrooms, entitle him to botanical commemoration.

1. *L. ovata*, common. 22. 1548. (*Ophrys ovata*.) Woods and thickets. Per. 6.

2. *L. cordata*, heart-leaved. 5. 358. (*Ophrys cordata*.) Mountain heaths. Per. 7.

### Section 3.

#### EPIPACTIS. Helleborine.

Eff. Ch. Anther permanent. Nectary tumid underneath, contracted in the middle. See *EPIPACTIS*.

1. *E. latifolia*, broad-leaved. 4. 269. (*Serapias latifolia*.) Mountainous woods. Per. 7, 8.

2. *E. palustris*, marsh. 4. 270. (*Serap. palustris*.) Boggy meadows. Per. 7, 8.

3. *E. grandiflora*, white. 4. 271. (*Serap. grandifl.*) Chalky woods. Per. 6.

4. *E. ensifolia*, narrow-leaved. 7. 494. (*Serap. ensif.*) Mountain woods. Per. 6.

5. *E. rubra*, purple. 7. 437. (*Serap. rubra*.) Mountain woods, rare. Per. 6.

6. *E. Nidus avis*, bird's nest. 1. 48. (*Ophrys Nidus avis*.) Chalky woods. Per. 6.

#### MALAXIS. Tender Tway-blade.

Eff. Ch. Anther deciduous. Nectary undivided, sessile, flat underneath. Petals spreading. See *MALAXIS*.

It seems best not to make the reversed position of the flower, an essential part of the generic character.

1. *M. paludosa*, marsh. 1. 72. Turfy bogs. Per. 7.

2. *M. Loefelii*, lily-leaved. 1. 47. (*Ophrys Loefelii*.) Sandy bogs. Per. 7.

#### CORALLORRHIZA. Coral-root.

Eff. Ch. Anther deciduous. Nectary elongated underneath. Petals spreading. Column unconnected.

1. *C. innata*, spur-lefs. 22. 1547. (*Ophrys corallorr.*) Boggy woods. Per. 7.

Spur of the nectary short, combined with the germen. Root very much branched.

This interesting and rare little plant has hitherto been found in Scotland only, of the British dominions. Roots sent in moss from Edinburgh, by Mr. E. J. Maughan, blossomed in our garden. These are of a fleshy substance, much branched and divaricated, spreading horizontally; they still exhale, after having been seven years dried, a very sweet smell, like Vanilla. The slender stem, a span high, is invested with a few sheaths, but destitute of leaves, and bears a loose spike of a few small yellowish flowers. Mr. Brown, who has finally established this genus, detected the minute and concealed spur. We have a number of exotic species, especially from the East Indies, which seem to belong to Corallorrhiza. Their fleshy tuberous roots, and leafless scaly stems, are peculiar; and, like other species from North America, some of these plants have an evident spur, others an obsolete or concealed one.

### Ord. 2. Diandria.

#### CYPRIPEDIUM. Ladies'-slipper.

Eff. Ch. Calyx spreading. Petals spreading. Nectary inflated. Column with a posterior appendage.

1. *C. Calceolus*, common. 1. 1. Northern woods, rare. Per. 6.

Stem leafy. Appendage of the column elliptical, obtuse, channelled. Petals flat.

The figure in *Engl. Bot.* unfortunately represents the appendage as if angular and acute; inasmuch that it has been supposed to have been drawn from an American species, known by that character; but this supposition is refuted by a comparison of the plants. (See *CYPRIPEDIUM*.) The calyx, as we deem it, of this genus is considered by authors as composed of three leaves, like all the rest of the *Orchidæ*; though the two lowermost are, for the most part, nearly united into one.

### Ord. 3. Hexandria.

#### ARISTOLOCHIA. Birthwort.

1. *A. Clematidis*, common. 6. 398. Thickets and rubbish. Per. 7, 8.

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Class 21. MONOECIA.

Ord. 1. Monandria.

ZANNICHELLIA. Horned Pondweed.

1. *Z. palustris*, common. 26. 1844. Ditches and pools. Ann. 7.

Ord. 2. Triandria.

TYPHA. Reed-mace.

1. *T. latifolia*, great. 21. 1455. Pools and ditches. Per. 7.  
 2. *T. angustifolia*, lesser. 21. 1456. Pools, rare. Per. 6, 7.  
 3. *T. minor*, dwarf. 21. 1457. Marshes, rare. Per. 7.

SPARGANIUM. Bur-reed.

1. *S. ramosum*, branched. 11. 744. Rivers and ditches. Per. 7, 8.  
 2. *S. simplex*, unbranched. 11. 745. Waters, on gravel. Per. 7, 8.  
 3. *S. natans*, floating. 4. 273. Rivers and pools. Per. 7.

CAREX. Sedge.

1. *C. dioica*, common separate-headed. 8. 543. Bogs. Per. 5, 6.  
 2. *C. Davalliana*, prickly separate-headed. 30. 2123. Marshes. Per. 5, 6.  
 3. *C. pulicaris*, flea. 15. 1051. Marshes. Per. 6.  
 4. *C. pauciflora*, few-flowered. 29. 2041. Alpine bogs. Per. 6.  
 5. *C. stellulata*, little prickly. 12. 806. Marshes. Per. 5, 6.  
 6. *C. curta*, white. 20. 1386. Watery places, rare. Per. 6.  
 7. *C. elongata*, elongated. 27. 1920. Marshes, Yorkshire. Per. 6.  
 8. *C. ovalis*, oval-spiked. 5. 306. Marshes. Per. 6.  
 9. *C. remota*, remote. 12. 832. Moist groves. Per. 5, 6.  
 10. *C. axillaris*, axillary clustered. 14. 993. Bogs, rare. Per. 5, 6.  
 11. *C. incurva*, curved. 13. 927. Sandy mouths of rivers, rare. Per. 7, 8.  
 12. *C. arenaria*, flea. 13. 928. Sandy coast, abundantly. Per. 6.  
 13. *C. intermedia*, soft brown. 29. 2042. Marshes. Per. 5, 6.  
 14. *C. divisa*, bracteated marsh. 16. 1096. Salt marshes. Per. 5, 6.  
 15. *C. muricata*, greater prickly. 16. 1097. Moist meadows. Per. 5, 6.  
 16. *C. divulsa*, grey. 9. 629. Moist shady places. Per. 5.  
 17. *C. vulpina*, great spiked. 5. 307. Marshes. Per. 5.  
 18. *C. teretiuscula*, lesser paniced. 15. 1065. Marshes. Per. 5.  
 19. *C. paniculata*, great paniced. 15. 1064. Bogs. Per. 6.  
 20. *C. digitata*, fingered. 9. 615. Woods, on limestone. Per. 5.  
 21. *C. clandestina*, dwarf silvery. 30. 2124. Sunny rocks. Per. 5.  
 22. *C. pendula*, great pendulous. 33. 2315. Moist hedges. Per. 5, 6.

23. *C. strigosa*, loose pendulous. 14. 994. Groves. Per. 4, 5.  
 24. *C. sylvatica*, pendulous wood. 14. 995. Woods, frequent. Per. 5, 6.  
 25. *C. depauperata*, starved wood. 16. 1098. Woods, rare. Per. 5, 6.  
 26. *C. Melickoferi*, loose-spiked rock. 32. 2293. Alpine rocks. Per. 8.

Sheaths not half the length of the flower-stalk. Female spikes three, distant, erect, lax and slender. Fruit ovate, triangular, bluntly cloven, twice the length of the obtuse scale.

Willdenow, in Sp. Pl. v. 4. 276, gives a citation of Schkuhr's *Carices*, fig. 198, and adds that this is Hoppe's *C. alpina*. It has however nothing to do with *alpina* of Wahlenberg; see CAREX, n. 97.

27. *C. capillaris*, capillary. 29. 2069. Highland mountains. Per. 7, 8.  
 28. *C. rariflora*, loose alpine. 35. 2516. Lofty Highland mountains. Per. 7.

Sheaths extremely short. Female spikes nearly linear, pendulous; their scales loosely imbricated. Fruit obovate, with three blunt angles and depressed sides. Root creeping.

Wahlenberg makes this a variety of *limosa*, n. 30, with which it agrees in the creeping root, short sheaths, and drooping female spikes; but differs in its obovate, triangular, (not broad and compressed), fruit; much smaller size; and lax blacker scales.

29. *C. Pseudo-cyperus*, battard-cyperus. 4. 242. Marshes. Per. 6.  
 30. *C. limosa*, green and gold. 29. 2043. Spongy boggy pools. Per. 6.  
 31. *C. ustulata*, scorched alpine. 34. 2404. Alpine rivulets. Per. 7. See CAREX, n. 127.  
 32. *C. airata*, black. 29. 2044. Alpine meadows. Per. 6, 7.  
 33. *C. pulla*, ruffet. 29. 2045. Alpine pastures. Per. 7.  
 34. *C. pallens*, pale. 31. 2185. Meadows and groves. Per. 5, 6.  
 35. *C. flava*, yellow. 18. 1294. Marshes. Per. 5, 6.  
 36. *C. fulva*, tawny. 18. 1295. Marshes. Per. 6, 7.  
 37. *C. Oederi*, Oederian. 25. 1773. Moist meadows. Per. 7.  
 38. *C. extensa*, long-bracteated. 12. 833. Sea-coast. Per. 6.  
 39. *C. distans*, loose. 18. 1234. Marshes. Per. 6.  
 40. *C. binervis*, green-ribbed. 18. 1235. Dry heaths. Per. 6.  
 41. *C. praecox*, vernal. 16. 1099. Open pastures, common. Per. 4.  
 42. *C. pilulifera*, round-headed. 13. 885. Pastures and heaths. Per. 4, 5.  
 43. *C. tomentosa*, downy-fruited. 29. 2046. Meadows, rare. Per. 6.  
 44. *C. rigida*, rigid. 29. 2047. Lofty mountains. Per. 6, 7.  
 45. *C. panicea*, pink-leaved. 21. 1505. Moist meadows. Per. 5, 6.  
 46. *C. recurva*, glaucous heath. 21. 1506. Pastures and heaths. Per. 5, 6.  
*C. Micheliana*, Fl. Brit. 1004. E. B. 32. 2236, is now found to be only a variety of *recurva*, with smooth fruit, and several male spikes.  
 47. *C. capitata*, tufted bog. 21. 1507. Marshes. Per. 5.  
 48. *C. stricta*, glaucous straight-leaved. 13. 914. Marshes. Per. 4.

PLANTS.

49. *C. acuta*, slender-spiked. 9. 580. Watery places. Per. 5.  
 50. *C. paludosa*, lesser common. 12. 807. Watery places. Per. 5.  
 51. *C. riparia*, great common. 9. 579. Watery places. Per. 4, 5.  
 52. *C. levigata*, smooth-stalked beaked. 20. 1387. Bogs. Per. 5.  
 53. *C. vesicaria*, short-spiked bladder. 11. 779. Marshes. Per. 5.  
 54. *C. ampullacea*, slender-beaked bladder. 11. 780. Bogs. Per. 5.  
 55. *C. hirta*, hairy. 10. 685. Boggy meadows. Per. 5, 6.  
 56. *C. filiformis*, slender-leaved. 13. 904. Bogs, rare. Per. 6.

KOBRESIA. Kobresia.

1. *K. caricina*, sedgey. 20. 1410. Moist mountains. Per. 8.

ERIOCAULON. Pipewort.

1. *E. septangulare*, jointed. 11. 733. Lakes, Scotland and Ireland. Per. 9.

Ord. 3. *Tetrandria*.

LITTORELLA. Shore-weed.

1. *L. lacustris*, plantain. 7. 468. Sandy puddles. Per. 6.

BETULA. Birch.

1. *B. alba*, common. 31. 2198. Sandy or mountain woods. Tree. 4, 5.  
 2. *B. nana*, dwarf. 33. 2326. Boggy mountain heaths. Shrub. 5.  
 3. *B. Alnus*, alder. 21. 1508. Watery meadows. Tree. 3.

BUXUS. Box.

1. *B. sempervirens*, common. 19. 1341. Chalky hills. Shrub. 4.

URTICA. Nettle.

1. *U. pilulifera*, Roman. 3. 148. Rubbish on the coast. Ann. 6, 7.  
 2. *U. urens*, small. 18. 1236. Cultivated ground. Ann. 6—10.  
 3. *U. dioica*, great. 25. 1750. Waste ground. Per. 7, 8.

Ord. 4. *Pentandria*.

XANTHIUM. Bur-weed.

1. *X. strumarium*, small burdock. 36. 2544. Dunghills, rare. Ann. 8, 9.

AMARANTHUS. Amaranth.

1. *A. Blitum*, wild. 31. 2212. Dunghills, rare. Ann. 8.

BRYONIA. Bryony.

1. *B. dioica*, red-berried. 7. 439. Hedges. Per. 5—9.

Ord. 5. *Polyandria*.

CERATOPHYLLUM. Hornwort.

1. *C. demersum*, common. 14. 947. Ditches, frequent. Per. 8, 9.  
 2. *C. submersum*, unarmed. 10. 679. Ditches, rare. Per. 9.

MYRIOPHYLLUM. Water-millfoil.

1. *M. spicatum*, spiked. 2. 83. Ditches and ponds. Per. 7, 8.  
 2. *M. verticillatum*, whorled. 4. 218. Ponds, rare. Per. 7.

SAGITTARIA. Arrow-head.

1. *S. sagittifolia*, common. 2. 84. Rivers and ditches. Per. 7, 8.

ARUM. Cuckow-pint.

1. *A. maculatum*, spotted. 19. 1298. Thickets and woods. Per. 5.

POTERIUM. Garden-Burnet.

1. *P. Sanguisorba*, common. 12. 860. Chalky hills. Per. 7.

QUERCUS. Oak.

1. *Q. Robur*, common British. 19. 1342. Woods and hedges. Tree. 4.  
 2. *Q. sessiliflora*, sessile-fruited. 26. 1845. Woods. Tree. 4, 5.

FAGUS. Beech.

1. *F. Castanea*, sweet chestnut. 13. 886. Woods. Tree. 5.  
 2. *F. sylvatica*, common. 26. 1846. Chalky hills. Tree. 4, 5.

CARPINUS. Horn-beam.

1. *C. Betulus*, common. 29. 2032. Woods, on clay. Tree. 5.

CORYLUS. Nut.

1. *C. Avellana*, hazel. 11. 723. Woods and hedges. Small tree. 3, 4.

Ord. 6. *Monadelphica*.

PINUS. Fir.

1. *P. sylvestris*, common Scotch. 35. 2460. Scottish hills. Tree. 5.

Class 22. *DIOECIA*.

Ord. 1. *Diandria*.

SALIX. Willow.

1. *S. purpurea*, bitter purple. 20. 1388. Marshes, rare. Shrub. 3.  
 2. *S. Helix*, rose. 19. 1343. Marshes. Small tree. 3, 4.  
 3. *S. Lambertiana*, Boyton. 19. 1359. Banks of rivers. Small tree. 3, 4.  
 4. *S. Forbiana*, basket osier. 19. 1344. Osier holts. Shrub. 4.  
 5. *S. rubra*, green osier. 16. 1145. Osier holts. Small tree. 4, 5.  
 6. *S. Croceana*, broad-leaved monadelphous. 16. 1146. Marshes. Small tree. 4, 5.  
 7. *S. triandra*, long-leaved triandrous. 20. 1435. Meadows. Tree. 5 and 8.  
 8. *S. lanceolata*, sharp-leaved triandrous. 20. 1436. Meadows. Tree. 4, 5.  
 9. *S. amygdalina*, almond-leaved. 27. 1936. Marshes. Tree. 4, 5.

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10. *S. decipiens*, varnished. 27. 1936. Woods and hedges. Tree. 5.
11. *S. Ruffelliana*, Bedford. 26. 1808. Woods and meadows. Tall tree. 4, 5.
12. *S. fragilis*, crack. 26. 1807. Meadows and marshes. Tree. 4, 5.
13. *S. pentandra*, bay-leaved. 26. 1805. Banks of rivers. Tree. 5, 6.
14. *S. nigricans*, dark broad-leaved. 17. 1213. Meadows. Small tree. 4.
15. *S. bicolor*, shining dark-green. 26. 1806. Woods. Shrub. 4, 5.
- †16. *S. petiolaris*, dark long-leaved. 16. 1147. Marshes. Shrub. 4.
17. *S. phyllifolia*, tea-leaved. 28. 1958. Highlands of Scotland. Shrub. 5.
- S. radicans*, Fl. Brit. 1053, proves to be the same species.
18. *S. Arbuscula*, little tree. 19. 1366. Mountains of Scotland. Shrub. 4.
19. *S. vitellina*, yellow. 20. 1389. Marshy meadows. Tree. 5.
20. *S. tenuifolia*, thin-leaved. 31. 2186. Stony hills. Shrub. 5, 6.
21. *S. malifolia*, apple-leaved. 23. 1617. Hills? Shrub. 5.
22. *S. myrsinites*, green whortle-leaved. 19. 1360. Highlands. Shrub. 5, 6.
23. *S. prunifolia*, plum-leaved. 19. 1361. Highlands. Shrub. 4, 5.
24. *S. venulosa*, veiny-leaved. 19. 1362. Highlands. Shrub. 4, 5.
25. *S. vacciniifolia*, bilberry-leaved. 33. 2341. Scotland. Shrub. 4.
26. *S. carinata*, folded-leaved. 19. 1363. Highlands. Shrub. 4.
27. *S. Dicksoniana*, broad-leaved mountain. 20. 1390. Highlands. Shrub. 4.
- S. myrtilloides*, Fl. Brit. 1056, but not of Linnæus.
28. *S. herbacea*, leaf. 27. 1907. Micaceous mountains. Small shrub. 6.
29. *S. reticulata*, wrinkled. 27. 1908. Highlands. Small shrub. 6.
30. *S. arenaria*, downy mountain. 26. 1809. Highlands. Shrub. 5.
31. *S. glauca*, glaucous mountain. 26. 1810. Highlands. Shrub. 5.
32. *S. Stuartiana*, shaggy mountain. 36. 2586. Highlands. Shrub. 7.
33. *S. argentea*, silky sand. 19. 1364. Sandy sea-coast. Shrub. 5.
34. *S. prostrata*, prostrate dwarf. 28. 1959. Moist hills. Small shrub. 5, 6.
35. *S. fufca*, brownish dwarf. 28. 1960. Mountainous heaths. Small shrub. 5.
36. *S. parvifolia*, small-leaved dwarf. 28. 1961. Moist meadows. Shrub. 5.
37. *S. ascendens*, ascending dwarf. 28. 1962. Moist heaths. Shrub. 5.
38. *S. repens*, creeping dwarf. 3. 183. Sandy moist heaths. Small shrub. 5.
39. *S. rosmarinifolia*, rosemary-leaved. 19. 1365. Moist sand. Shrub. 4, 5.
40. *S. cinerea*, grey. 27. 1897. Woods. Small tree. 5.
41. *S. aurita*, round-eared fallow. 21. 1487. Woods. Shrub. 4, 5.
42. *S. aquatica*, common water fallow. 20. 1437. Wet thickets. Small tree. 4.
43. *S. oleifolia*, olive-leaved fallow. 20. 1402. Woods and hedges. Tree. 3.
44. *S. rupestris*, filky rock. 33. 2342. Highland rocks. Small shrub. 4.
45. *S. Anderfoniana*, green mountain fallow. 33. 2343. Scotland. Shrub. 5.
46. *S. Forsteriana*, glaucous mountain fallow. 33. 2344. Scotland. Small tree. 5.
47. *S. cotinifolia*, quince-leaved. 20. 1403. Woods. Shrub. 4.
48. *S. hirta*, hairy branched. 20. 1404. Woods. Small tree. 4, 5.
49. *S. sphacelata*, withered-pointed. 33. 2333. Scotland. Tree. 4, 5.
50. *S. caprea*, great round-leaved fallow. 21. 1488. Dry woods. Tree. 4.
51. *S. acuminata*, long-leaved fallow. 20. 1434. Moist woods. Tree. 4.
52. *S. stipularis*, auricled osier. 17. 1214. Osier holts. Tree. 3.
53. *S. mollissima*, velvet osier. 21. 1509. Osier holts. Small tree. 4.
54. *S. viminalis*, common osier. 27. 1898. Osier holts, &c. Tree. 4, 5.
55. *S. alba*, common white. 34. 2430. Woods and meadows. Tree. 4, 5.
56. *S. cærulea*, blue. 34. 2431. Moist meadows. Large tree. 5.

### Ord. 2. Triandria.

#### EMPETRUM. Crake-berry.

1. *E. nigrum*, black. 8. 526. Mountain moors. Small shrub. 5.

#### RUSCUS. Butcher's-broom.

1. *R. aculeatus*, common. 8. 560. Woods and thickets. Per. 3, 4.

### Ord. 3. Tetrandria.

#### VISCUM. Mistletoe.

1. *V. album*, white. 21. 1470. On trees. Small shrub. 5.

#### HIPPOPHÆE. Sallow-thorn.

1. *H. rhamnoides*, sea. 6. 425. Sandy cliffs. Small tree. 5.

#### MYRICA. Gale.

1. *M. Gale*, sweet. 8. 562. Spongy bogs. Shrub. 5.

### Ord. 4. Pentandria.

#### HUMULUS. Hop.

1. *H. Lupulus*, common. 6. 427. Thickets and hedges. Per. 7.

### Ord. 5. Hexandria.

#### TAMUS. Black-bryony.

1. *T. communis*, common. 2. 91. Woods and hedges. Per. 6.

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## Ord. 6. *Oñandria*.

### POPULUS. Poplar.

1. *P. alba*, white. 23. 1618. Moist woods, or hills. Tree. 3.
2. *P. canescens*, grey. 23. 1619. Watery meadows. Tree, 3.
3. *P. tremula*, aspen. 27. 1909. Boggy woods. Tree. 3, 4.
4. *P. nigra*, black. 27. 1910. Watery weadows. Tree. 3.

### RHODIOLA. Rose-root.

1. *R. rosea*, mountain. 8. 508. Alpine rocks. Per. 5, 6.

## Ord. 7. *Enneandria*.

### MERCURIALIS. Mercury.

1. *M. perennis*, perennial. 26. 1872. Groves and thickets. Per. 4, 5.
2. *M. annua*, annual. 8. 559. Rubbish. Ann. 7—9.

### HYDROCHARIS. Frog-bit.

1. *H. Morfus ranae*, common. 12. 808. Ditches. Per. 7.

## Ord. 8. *Monadelphica*.

### JUNIPERUS. Juniper.

1. *J. communis*, common. 16. 1100. Chalky downs. Shrub. 5.

### TAXUS. Yew.

1. *T. baccata*, common. 11. 746. Woods and rocks. Tree. 3, 4.

## Class 23. POLYGAMIA.

### Ord. 1. *Monoccia*.

#### ATRIPLEX. Orache.

1. *A. portulacoides*, shrubby. 4. 261. Muddy sea-coast. Small shrub. 7, 8.
2. *A. laciniata*, frosted sea. 3. 165. Sandy coast. Ann. 7.
3. *A. patula*, spreading halberd-leaved. 13. 936. Rubbish. Ann. 6—8.
4. *A. angustifolia*, spreading narrow-leaved. 25. 1774. Rubbish. Ann. 6—8.
5. *A. erecta*, upright spear-leaved. 31. 2223. Fields, rare. Ann. 8.
6. *A. littoralis*, grass-leaved sea. 10. 708. Muddy coast. Ann. 8, 9.
7. *A. pedunculata*, stalked sea. 4. 232. Muddy coast, rare. Ann. 8, 9.

Pallas in his Travels, English edition v. 1. 291, calls this last species *Ceratocarpus salinus*.

## Class 24. CRYPTOGAMIA.

### Ord. 1. *Filices*.

#### EQUISETUM. Horfe-tail.

Seven species, chiefly found in moist or watery places. Perennial. 4—8.

#### BOTRYCHIUM. Moon-wort.

*Swartz Syn. Fil.* 8.

Eff. Ch. Capsules without a ring, globose, even, sessile on a compound flattened stalk.

1. *B. Lunaria*, common. 5. 318. (*Osmunda Lunaria*). Pastures. Per. 6.

Fronde pinnate, flowering from its base; leaflets crescent-shaped, crenate.

A span high, smooth, pale green, simply pinnate, with about six pair of leaflets, and one branched spike.

#### OSMUNDA. Osmund-royal.

1. *O. regalis*, common. 3. 209. Shady bogs. Per. 6, 7.

#### LYCOPODIUM. Club-moss.

Six species. Heathy mountainous places. Per. 6—8.

#### POLYPODIUM. Polypody.

Four species. Walls or dry hills. Per. 5—10.

#### ASPIDIUM. Shield-fern.

Twelve species. Rocks, heaths, bogs, or shady places. Per. 5—7.

This genus differs from *Polypodium*, only in having a membranous involucre to the dots of fructification. See POLYPODIUM.

#### ASPLENIUM. Spleenwort.

Eight species. Rocks or walls. Per. 3—10.

#### SCOLOPENDRIUM. Hart's-tongue.

1. *S. vulgare*, common. 16. 1150. Moist shady places. Per. 7.
2. *S. Ceterach*, scaly. 18. 1244. Rocks and walls. Per. 4—10.

#### BLECHNUM. Blechnum.

1. *B. boreale*, northern. 17. 1159. Dry stony heaths. Per. 7.

#### PTERIS. Brake.

1. *P. aquilina*, common. 24. 1679. Pastures and woods. Per. 7.
2. *P. crispa*, rock. 17. 1160. Stony hills in the north. Per. 7.

#### ADIANTUM. Maiden-hair.

1. *A. Capillus-Veneris*, true. 22. 1564. Marine rocks, rare. Per. 5—9.

#### CYATHEA. Cup-fern.

Three species. Rocks or walls. Per. 6, 7.

#### WOODSIA. Bristle-fern.

*Brown Tr. of Linn. Soc.* v. 11. 170. t. 11.

1. *W. hyperborea*, alpine. 29. 2023. (*Polypodium hyperboreum*.) Rocks. Per. 6.

#### TRICHOMANES. Hair-fern.

1. *T. brevifetum*, short-bristled. 20. 1417. (*Hymenophyllum alatum*.) Wet rocks in Yorkshire and Ireland, rare. Per. 5, 6.

#### HYMENOPHYLLUM. Filmy-fern.

1. *H. Tunbridgensis*, Tunbridge. 3. 162. Moist rocks. Per. 5, 6.

#### PILULARIA. Pillwort.

1. *P. globulifera*, pepper-grass. 8. 521. Moist heaths. Per. 6, 7.

#### ISOETES.

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## ISOETES. Quillwort.

1. *I. lacustris*, mountain. 16. 1084. Alpine lakes.  
Per. 5, 6.

## Ord. 2. *Musci*.

### SPIAGNUM. Bog-mofs.

Four species. Clear watery bogs. Per. 6.

### BUXBAUMIA. Buxbaumia.

1. *B. aphylla*, naked-stalked. 23. 1596. Barren heaths,  
rare. Ann. 12—2.  
2. *B. foliosa*, leafy. 5. 329. Shady rocks. Ann. 7.

### PHASOUM. Earth-mofs.

Seventeen species. Banks, heaths and woods. Ann. 3—5.

### GYMNOSTOMUM. Beardless mofs.

Twenty species. Banks, rocks, and mountains. Ann.  
or per. 3—8.

### SPLACHNUM. Gland-mofs.

Thirteen species. Mountains or bogs, or dung. Ann. 5, 6.

### ANDRÆA. Andræa.

*Fl. Brit.* 1178. *Hooker Tr. of Linn. Soc.* v. 10. 381.  
See ANDRÆA, JOHN.

Eff. Ch. Capsule oblong, of four valves, whose points  
adhere to the lid. Fringe none.

1. *A. rufesfris*, dusky rock. 18. 1277. Moist alpine  
rocks. Per. 6.

Leaves lanceolate, keeled, fickle-shaped, leaning one way,  
without a rib.

2. *A. Rothii*, black mountain. 31. 2162. Dry rocks.  
Per. 6.

Leaves lanceolate, keeled, fickle-shaped, with a mid-rib,  
leaning one way. Sheath-scales without a rib.

3. *A. alpina*, chocolate alpine. 18. 1278. Alpine rocks.  
Per. 6.

Leaves ovate-oblong, concave, ribless, imbricated every  
way.

4. *A. nivalis*, tall slender. 33. 2334. Lofty alpine rocks.  
Per. 6.

Leaves loosely imbricated, lanceolate, curved towards one  
side, single-ribbed, as well as the sheath-scales.

This last is three inches, or more, in height, being much  
taller, and more branched, than any of the rest. The char-  
acter of the genus was totally mistaken by Hedwig and  
others, the valves of the capsule being supposed the fringe,  
till Mr. W. J. Hooker corrected the character, as above.  
See FRINGE of *Mosses*.

### TETRAPHIS. Four-toothed-mofs.

1. *T. pellucida*, transparent. 15. 1020. Wet shady  
places. Ann. 3, 4.

Capsule cylindrical. Leaves ovate, acute, single-ribbed.

2. *T. ovata*, dusky. 22. 1422. (*Grimmia Browniana*.)  
Sand rocks. Ann. 3.

Capsule ovate. Radical leaves strap-shaped, obtuse,  
ribless.

Great diversity of opinion has existed respecting the  
genus of this moss, referred to *Orthotrichum* in *Fl. Brit.* 1269,  
and incorrectly drawn, as to the fringe, in *Engl. Bot.* A  
German botanist, named Funk, has shewn that part to con-

sist of four teeth only. This species must be allowed to  
accord very ill in habit with the first.

### ENCALYPTA. Extinguisher-mofs.

Five species. Banks and rocks. Per. 3—8.

### GRIMMIA. Grimmia.

Thirty-one species. Banks, rocks, and trees. Mostly  
per. 4—7.

From these is to be deducted *G. Forsteri*, 31. 2225, as  
being the same with *Mnium conoideum*. See GRIMMIA and  
MNIUM.

### DICRANUM. Fork-mofs.

Forty-eight species. Woods, hills and bogs. Mostly per.  
4—8.

From this genus, as it stands in *Fl. Brit.*, four species  
are to be deducted; *callistomum*, n. 15, as being the same  
with *rigidulum*, *Engl. Bot.* 20. 1439; *pulvinatum*, n. 21,  
removed to *Grimmia*, 24. 1728; *sciuroides*, n. 22, removed  
to *Pterogonium*, 27. 1903; and *viridissimum*, n. 34, re-  
moved to *Gymnostomum*, 22. 1583. Their place is sup-  
plied by four others; *Bruntoni*, 35. 2509; *Starkii*, 31.  
2227; *latifolium*, 35. 2492; and *virens*, 31. 1462.

### TRICHOSTOMUM. Fringe-mofs.

Eighteen species. Rocks, heaths or water. Per. 4—8.  
*T. cirratum*, *Fl. Brit.* n. 6, is to be expunged, as not dif-  
fering from *Dicranum polyphyllum*, 17. 1217.

### TORTULA. Screw-mofs.

Nineteen species. Banks, heaths and walls. Per. 3—12.

### ORTHOTRICHUM. Bristle-mofs.

Eleven species. Trees, wet rocks, &c. Per. 1—4.

*O. Brownianum*, *Fl. Brit.* 1269, is *Tetraphis ovata*.

### PTEROGONIUM. Wing-mofs.

Six species. Trees and rocks. Per. 4, 5.

We postpone remarks on this genus till it comes in its  
proper place. See PTEROGONIUM.

### NECKERA. Neckera.

Six species. Trees and rocks. Per. 2—4.

Among them is the following very curious moss, disco-  
vered since our article NECKERA was published.

*N. splachnoides*. Pear-fruited Neckera. 36. 2564.

Stem branched, spreading. Leaves lanceolate, pointed,  
flat, spreading every way; those of the sheath six, in two  
rows. Fruit-stalk granulated above. Capsule erect, con-  
tracted at the base. Veil fringed.

Found by Dr. Taylor on the Secawn mountain near  
Dublin.

### HYPNUM. Feather-mofs.

Eighty-one species. Trees, rocks and bogs. Per. 2—10.

From the 77 species in *Fl. Brit.* are to be removed *lucens*,  
n. 25, which is *Hookeria lucens*; and *filamentosum*, n. 42,  
which has been shewn by Dr. Swartz to be the same as  
*dubium*, n. 74. Six are added in their stead; *pratense*,  
*Turn. Musc. Hib.* 161; *silesianum*, *Engl. Bot.* 28. 2016;  
*Thuringicum*, *Turn. Musc. Hib.* 181; *squarrosulum*, 24.  
1709; *fallax*, 30. 2127; and *Crista-castrensis*, 30. 2108.

### HOOKERIA. Hookeria.

1. *H. lucens*, shining. 27. 1902. Shady bogs. Per.  
4—7.

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## FONTINALIS. Water-mofs.

Three species. Running waters. Per. 7, 8.

## FUNARIA. Cord-mofs.

1. *F. hygrometrica*, twisting. 5. 342. (*Bryum hygrometricum*). Sandy ground. Ann. 4, 5.  
Stem none. Leaves concave, converging, entire, acute. Capfule obovate. Lid convex.
2. *F. Muhlenbergii*, hair-pointed. 21. 1497. Mountain heaths. Ann. 4, 5.  
Stem short, fimple. Leaves concave, finely ferrated, hair-pointed. Capfule oblique. Lid flightly conical.
3. *F. Templetoni*, long-fruited. 36. 2524. Ireland. Per. 5?  
Stem elongated, fomewhat branched. Leaves fspreading, ovate, entire, acute. Capfule obovate, tapering at the bafe.

## BARTRAMIA. Bartramia.

Eff. Ch. Capfule fpherical, at length furrowed. Outer fringe of 16 tapering teeth; inner a plaited membrane.

The original *Bartramia* being referred to *Triumfetta*, this genus of mofs has been dedicated to the memory of Mr. John Bartram, the venerable correspondent of Linnæus, Collinfon, Fothergill and other naturalifts, who during his travels in North America, contributed greatly to enrich the gardens and museums of Europe. See the end of the article BRYUM. We here fubjoin a more ample lift of British fpecies.

1. *B. Halleriana*, lateral. 14. 997. Mountain rivulets. Per. 6, 7.  
Fruit-ftalks lateral, curved, fhorter than the linear-awl-fhaped, fingle-ribbed, even leaves.
2. *B. pomiformis*, apple. 14. 998. Shady rocks and banks. Per. 4, 5.  
Fruit-ftalks erect, furmounting the ftems. Leaves awl-fhaped, fingle-ribbed.
3. *B. crispata*, frizzled. 22. 1526. Northumberland. Per. 4, 5.  
Fruit-ftalks erect, furmounting the ftems. Leaves linear-awl-fhaped, broad at the bafe, curled when dry. Capfule rather oblique. Lid obtufely conical.
4. *B. tibiphylla*, ftraight-leaved. 24. 1710. Wales and north of England. Per. 5.  
Fruit-ftalks furmounting the ftems. Leaves capillary, with a very broad bafe, entire; very ftraight when dry.
5. *B. gracilis*, tall fender. 26. 1826. Highlands. Per. 7, 8.  
Fruit-ftalks erect, furmounting the ftems. Leaves lanceolate, revolute, fingle-ribbed; ferrated towards the point. Stems elongated.
6. *B. fontana*, fountain. 6. 390. (*Bryum fontanum*). Boggy mountains. Per. 6, 8.  
Fruit-ftalks erect, much taller than the clustered, erect, thread-fhaped branches. Leaves ovate, entire.
7. *B. marchica*, bog. 29. 2074. Highland water-falls. Per.  
Fruit-ftalks erect, taller than the ftems. Leaves lanceolate, finely ferrated, imbricated in five rows. Branches clustered, fender, upright.
8. *B. arcuata*, curve-ftalked. 18. 1237. Mountain bogs, rare. Per. 7.  
Fruit-ftalks recurved. Leaves lanceolate, furrowed, finely ferrated. Branches fcattered, fspreading.

## MNIUM. Spring-mofs.

1. *M. androgynum*, narrow-leaved. 18. 1238. Shady wet places. Per. 3, 4.

2. *M. coinodeum*, club-fruited. 18. 1239. Trees. Per.
3. *M. palustre*, greater forked. 6. 391. (*Bryum palustre*.) Bogs. Per. 5—7.

## BRYUM. Thread-mofs.

Thirty-four fpecies. Heaths, bogs, mountains. Mostly per. 3—9.

A full account of the thirty-three fpecies of Fl. Brit. is given by our excellent predeceffor, the Rev. Mr. Wood; fee BRYUM. From thefe we have only to remove the *inclians*, n. 23, which Mr. F. Eagle has difcovered to be no other than *Dicranum virens*, E. B. 21. 1462. — *B. cylindricum*, n. 6, is *longicollum*, Swartz Mufc. Succ. 49. t. 6. f. 13. *Webera longicolla* of Hedwig. — *B. marginatum*, n. 20, is *ferratum*, Schrad. Spicil. 71. Two fpecies are to be added.

- B. triquetrum*, long ftalked. 34. 2394. Bogs, Ireland. Per. 7.

Stem fubdivided. Branches fimple, erect. Leaves fspreading in three rows, ovato-lanceolate, fsharp-pointed, finely ferrated. Capfule felder-pear-fhaped, oblique and incurved. Lid conical. The fruit-ftalks exceed all other British mofs in length, extending to three or four inches.

- B. obtuffifolium*, blunt-leaved. Turn. Mufc. Hib. 116. t. 11, f. 1. Ireland.

“Stem nearly fimple. Leaves ovate, obtufe, concave, converging. Capfule obovate, oblique. Lid boffed.” This is one of the very few mofs of which fpecimens have not yet been procured for delineation in *Engl. Bot.*

## POLYTRICHUM. Hair-mofs.

Sixteen fpecies. Heaths and mountains. Per. or ann. 3—8. See POLYTRICHUM hereafter.

## Ord. 3. Hepatica.

## JUNGERMANNIA. Jungermannia.

Above feventy fpecies, now illuftrating by Mr. W. J. Hooker, in an elegant and learned monograph. Sixty-eight are figured in *Engl. Bot.*

## BLASIA. Blafia.

1. *B. pusilla*, dwarf. 19. 1328. Damp fandy places. Ann. 10, 11.

## TARGIONIA. Targionia.

1. *T. hypophylla*, dotted. 4. 287. Shady banks, rare. Per. 3, 4.

## SPHÆROCARPUS. Bladder-grain.

1. *P. terrestris*, reticulated. 5. 299. Turnip and clover fields. Ann. 11.

## MARCHANTIA. Marchantia.

Five fpecies. Shady places, or rocks. Per. Various feafons.

## RICCIA. Riccia.

Four fpecies. Sandy heaths, or in ponds. Ann? 8—12. *R. fruticulofa* is a *Jungermannia*, probably not diftinct from *furcata*. See E. B. 35. 2514.

## ANTHOCEROS. Horn Liverwort.

1. *A. punctatus*, jagged-leaved. 22. 1537. Damp fandy ground. Ann. 6.

2. *A.*

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2. *A. major*, broad-leaved. 22. 1538. With the former. Ann. 6.

*A. lewis* of Linnæus, who erroneously supposed it had no warts, or male flowers.

3. *A. multifidus*, fine-cut. Dill. t. 68. f. 4. Highland rocks. *Dickson*.

### Ord. 4. *Algae*.

This order begins with the natural family of LICHENES; (see that article.) Of these, 391 are figured in *Engl. Bot.*; but several still remain for further examination. An ample view of numerous species, both native and exotic, may be found under the article LICHEN; and their terminology, physiology, and generic distribution, under LICHENES.

The following, except the first genus, which is of an amphibious nature, are aquatic, or submersed, *Alge*.

#### TREMELLA. Jelly-bladder.

About twenty species, found on rotten wood, in water, or on the ground, after much wet.

#### ULVA. Laver.

About thirty-five species. In fresh or salt water. Ann. or per. Various seasons.

#### FUCUS. Fucus.

About ninety species. In salt water. Ann. or per. Various seasons.

#### RIVULARIA. Rivularia.

Eleven species are figured in *Engl. Bot.* Fresh or salt water.

#### CONFERVA. Conferva.

About 180 species. Fresh or salt water, at various seasons. Above 130 are figured in *Engl. Bot.*

#### VAUCHERIA. Vaucheria.

Three or four, not very well defined, species, found in fresh water. See *Engl. Bot.* v. 25.

#### BYSSUS. Byffus.

Hudson has nineteen species of this genus, but the number is much lessened in consequence of subsequent enquiries; inasmuch that it is hard to say what really constitutes a *Byffus* at all. The fibrous kinds are generally reducible to *Conferva*, the powdery ones to *Lepraria*. Some of the latter indeed, having occasionally produced shields, prove themselves either *Lecideæ* or *Parmeliæ*. See LICHENES.

### Ord. 5. *Fungi*.

Withering, who excels in this obscure department of British botany, describes about 556 species of *Fungi*, disposed in seventeen genera. Of these *Agaricus*, consisting of 282 species, is the principal. The distribution of the rest has been so much altered by following writers, and especially by Perfoon, that it would be useless to enter into any details concerning Withering's generic arrangement. The number of known British species is also greatly augmented since his time; so that perhaps they might be eliminated between 750 and 800. A great part of them are figured in Sowerby and Bolton. This order is purposely excluded from the *English Botany*, because it would have overloaded the Cryptogamic department of that work. It has met with few votaries, as yet, in this country. In Germany the *Fungi* have received particular attention. See FUNGI.

Thus at the end of the Vegetable, like the Animal Kingdom, our knowledge vanishes amongst undistinguishable, almost imperceptible, tribes, whose confines blend with each other. The imperfection which we proudly attribute to such as we cannot understand, rather belongs to our own limited powers, or to our superficial enquiries. The accuracy and minuteness of investigation, amongst naturalists of the present day, so far transcends what was usual thirty years ago, that the cryptogamic class, like the insect tribes, has displayed a new world, as it were, to the curious enquirer, and has smoothed the way for succeeding observers; who in their turn need apprehend no deficiency of occupation or entertainment.

PLANTS, in *Agriculture*, vegetable productions, of which there are numerous kinds, such as herbs of various sorts, comprehending all the different grasses, leguminous vegetables, and esculents of other descriptions; trees, including those of the large or timber kind, and those of a more low or shrubby growth, whether under the name of shrubs, or under-shrubs. But properly, in an agricultural point of view, they chiefly comprehend such grasses or plants of that nature as are employed as the food of animals, and such trees or other plants as are capable of being applied to the purposes of timber, or made use of in the business of husbandry. And it may be farther observed with respect to plants, that most of them are hermaphrodite, containing the male and female parts in the same flower; others have flowers on the same stems, some of which are male, and others female. Some likewise produce flowers over the whole without being followed by any fruit, while others of the same sort bear fruit with flowers, in consequence of which they are distinguished into male and female plants. There are many of this sort, as the hop, hemp, and the poplar tree. The female flowers are only followed by fruit, the hermaphrodites, in respect to this, being considered among the female. Plants are capable of being fecundated from very considerable distances, which is a circumstance that the farmer should carefully keep in mind in saving the seeds of particular sorts of plants, as all the cabbage tribe, and many others.

They require nourishment and air as well as animals to support, and keep them in a proper state of healthy growth, the former of which is principally drawn from the earth or the surrounding atmosphere. The gaseous materials are chiefly drawn from the atmosphere by the upper surfaces of their leaves, while the oxygen gas or *pure air* is given out during the sun-shine by their under surfaces. It is evident, therefore, that the means of support are provided in two different ways, by the radical or root fibres of the plant taking up one part and the leaves drinking up another, the former from the earth, and the latter from the air that surrounds them. See *FOOD of Plants*, and *MANURE*.

Most of the plants which are the principal objects of agriculture, are either raised and increased from the seeds, or the cuttings or other parts of roots, in the fields where they are to grow, as in all the grain and grass kinds, as well as in the potatoe; but there are a few in which the young plants, or offsets, are made use of, being set out in somewhat the garden method, and in which great care should constantly be taken that they are good in their kinds, and perfect in their nature and different parts. These are chiefly of the cabbage, madder, and other similar kinds.

Wheat plants are likewise sometimes transplanted, but the practice is by no means in any degree of a general nature.

In regard to the plants of the tree kind, which are frequently a good deal employed, they are sometimes raised and provided from the seeds in the places where they are to

## PLANTS.

grow; and at others reared and procured from the nursery grounds in the proper state for use in the forming of woods, plantations, and other sorts of wooded lands.

In the practice of planting, experience for a long time has sufficiently shewn, that where there is any degree of natural shelter or protection in the situation, and particularly where the ground has been properly prepared for the purpose, that such plants as have been transplanted in the nursery, and which are from a foot and a half to two or three feet in height, are the most suitable to be made use of in this intention. And it is directed by Mr. Loudon and others, that in performing the business, they should be placed from four to six feet distant from each other, being put into the soil in an irregular manner. But that in exposed situations and spots, where shelter and protection are only to be gained by putting them in in a thick or close method, or by that of planting nurseries, transplanted plants which are under a foot and a half in height should alone be had recourse to, being planted out from two feet and a half to four feet apart in such plantations. The space or distance between the plants in both these instances, must of necessity vary very greatly, according to the nature of the kind, and other circumstances. Also the borders and margins of large plantations, as well as narrow stripes and patches, ought to be thicker, or more closely planted with those sorts of plants, than the insides of great extents, though in the same exposures; but, on the contrary, where the ground is of a deep loamy quality, they may be put at wider distances, than where it is more thin and gravelly in its nature. Likewise in making very extensive plantations, it frequently becomes a matter of importance in setting out the plants, to place them in rows, as in this way they may be cultivated with much greater facility when they approach towards the growth of trees. For in many instances, the necessary cultivation, by such means, can be readily given with advantage by the plough and the horse-hoe; and not unfrequently different kinds of vegetables and roots may be introduced between the rows with great propriety and benefit, as those of the turnip, cabbage, onion, potatoe, carrot, and various other sorts.

It is contended that in all common plantations, the plants of these descriptions should be put into the ground with some degree of irregularity; but that wherever ornament is the least had in view, it should always be done in a manner, *irregularly irregular*; they should be grouped, or, in the more plain language of those engaged in the business, planted out just as if they had grown up by accident from the seed: or in such a manner as is seen in natural forests, where, in some parts, perhaps two or three trees appear to spring from one root, and in others quite thin and more detached. As by this means an endless variety of composition is produced, and at the same time an equal quantity of timber afforded, as the same would have yielded, if planted out in the most regular manner in respect to the distances. In proof of the truth of which, the above writer has adduced the common mode of thinning fields of young turnip plants, that have not sprung sufficiently thick. Some of the plants of which, it is asserted, may stand at two feet, others not above two inches separate from each other; but that wherever two are close together, by being unencumbered all round, they grow more vigorously than the others; and as the bulk swells, push each other asunder; so that in a short time the whole surface of the field is covered. The same thing, it is contended, takes place in natural woods. Suppose two spaces, containing twenty square yards each, and in each space two trees; but in one the trees to be planted three feet asunder, and the other three yards: when ten years growth has taken place, the bulk and height

produced upon each of the spaces would be exactly alike in every respect.

In regard to the methods of introducing or inserting the plants, in making plantations with them, they are in some measure different. The modes either by pitting them in or flitting are probably the best, as being the most generally practised; they may, however, be put in by the dibble, though it is a practice which can seldom be had recourse to with propriety or much success. With the pine and fir tribe of plants, the mode of planting is mostly considered as more cheap and expeditious, than that of sowing the seeds; but in raising large and extensive woods and forests, or other sorts of plantations, where most kinds of deciduous trees are required, and especially the oak and the ash, which should be the most generally grown, they ought to be produced from the seeds by sowing them in the situations where the plants are finally to remain and become trees. The seed of the oak put into the earth at the same time with a plant of the same kind five or six years old, will, it is supposed, over-top it in the course of seven years, and frequently sooner; besides, they are believed by some to last much longer, and ultimately to produce much better and more valuable timber. In all places where the ground is fully and properly prepared, and in which it is desirable to raise oak plants, for becoming trees, it will be found the best method to sow the seeds, as this can be done at less than a fifth of the expence of planting out the young plants, and besides, the trees will turn to advantage, either as timber or undergrowth much more expeditiously. And farther, as the oak is a particularly valuable sort of tree for its bark equally as well as for the timber, it ought to be universally raised; and were the above mode more generally attended to, there would be found a saving, even in the first place, of from three to four pounds the acre, which, to those who plant largely, would be of great consequence.

PLANTS, in *Gardening*, young living vegetables of any kind, which are raised or produced from a seed or in any other manner. Plants are of many different sorts and descriptions, as well as employed for a variety of different uses, and in a great diversity of intentions. They may, however, in the view of their garden culture, be principally considered as of the herbaceous, shrubby, and tree kinds, and as being annual, biennial, and perennial in their nature, and the time of their continuance.

Every plant may be said to consist of a root, that strikes down into the ground, or into some other body in some way or other, and which sends off numerous ramifications, which serve the purpose of fixing it in the earth or other situation, and at the same time to supply it with food or nourishment for its growth, increase, and continuance. There is likewise a stalk, stem, or trunk, which rises upwards into the atmosphere, and which is composed of a bark in the outer parts, a substance which is called *alburnum*, more internally a woody material, and a medullary matter, that is termed *pith*, in the inside of the whole. From this stem or trunk are formed and sent off the different branches and twigs, which contain the leaves and flowers, and which are very different in different sorts of plants. Besides which, all plants are furnished and provided with different sorts of vessels for conveying their sap, juices, and other kinds of fluids, and endued with several different powers, motions, and properties, which serve their different habits of growth, and the uses and intentions which they are to fulfil. See VEGETABLE, and VEGETATION.

The mode of growth and increase in plants, after they have been evolved and sprung up from seeds, or in any other

other manner, is described somewhat in this way by a late writer upon the structure and economy of plants; the root part of a plant at first advances more rapidly than the stem; as it has been found that an oak plant a foot and a half high has a root four feet in length, and that, if the principal root be in any way mutilated, the plant emits radicles in every direction; which always grow faster than if the root had remained perfect. Such radicles at first do not receive any considerable increase; but soon afterwards augment into a body almost equal to the principal root, and then protrude new radical shoots in a lateral direction. Also, that the roots are prolonged at the extreme apex or point, as will be perfectly evident, if any root be coloured with varnish or any other substance of a similar kind in different places; and it is, likewise, well known, that the radicles always shoot out in that part where the earth is the most humid, so that walls are not unfrequently thrown down or overturned by their power of penetrating towards moist places, or situations where the soil is the most soft in its nature.

But the trunk of a plant is expanded throughout its whole length, and not at the apex only, as in the case of the root; for if the tender stem of a plant, at the beginning of spring, be coloured over with varnish, or any other matter of the same kind, and marked in different places, the marks will, after a few months, be found to have receded in the several different parts when formed.

It is found that, in the growth, in an *annual* plant, the expansion of the stem in length continues until the explanation of the flowers has fully taken place; at which time the fibres that constitute the stalk, begin to grow hard, and to be indurated, and ultimately in a gradual manner to become dry and firm.

But in a *perennial* plant the increase of the stem continues until the leaves fall, or are destroyed in the autumnal season; during which time a germ or bud arises in the apex, in which the rudiment of the new stem, during winter, increases slowly until the following spring; when casting off its winter involucre, it continues the increase of the stem in the same way as the inferior part increased during the former year: for in that place where a bud is seated, a tumour extends, which is so continued with the new stem as scarcely to leave any vestige behind it.

It is remarked, that the increase of the stem in breadth does not arise from the dilatation of the ligneous or woody layers, but from the generation of new layers, which are annually deposited by the vessels of the bark. This is said to be fully explained and illustrated by the following experiments. "If the ring of the bark be torn from the trunk of a tree, and the ligneous cylinder of the naked part be perfectly surrounded with a leaf of tin, and the whole (after having replaced the cut-out ring of the bark) be covered with the tree plaster; then, upon cutting the tree some years after, it will appear that the ligneous cylinder, covered with tin, has received no increase, and that the tin, inserted between the ligneous cylinder and the new ligneous strata, is complete. These ligneous strata appear to be generated from the cortex; for if metallic threads be inserted obliquely into the cortex, they are after some years found in the wood itself, and not in the cortex or bark of the tree or plant."

It is shewn by attentive observation, that the trunk of a tree receives two ligneous or woody layers in the course of the year; but that the thickness of these layers is not the same every year; for it is the greatest when the tree is of a middle age, and the warmer the summer the more slender is the bark.

It would seem, that the bark is protruded by the vital

or living power of the vessels, which are placed in the wood of the tree or plant.

And the generation of the branches is supposed to be from the corona, or plexus of vessels, which is situated between the wood and medulla, or pith, from whence they proceed. Each germ or bud produces a new branch, so that it may be said to give birth to a new plant, which was shut up and laid concealed in that particular bud; for the branch contains every part which is essentially necessary to form a new plant, as is evident from cutting off a branch, and planting it in the ground, by which means a perfect tree or plant is produced, and soon grows up. The vessels, it is believed, principally protrude where there is the least resistance in the bark, as in the axilla of the leaves, the nodes, and the joints; the same is noticed in respect to the branches of the root, and explains the reason, why the propagation of plants does not succeed by the slip or branch, unless a node, joint, or germ remain in them. Also why, if a branch of a tree or plant, that is yet adhering to it, be plastered or covered round with earth or moist dung, there proceeds from it a root into these substances. And why the ancients falsely attributed the generation or production of boughs to the medulla or pith of the tree; as in trees which are destitute of this substance, it is seen that no branches are produced or brought forth.

Further, the generation or production of leaves in plants originates from the vessels of the bark only; for, the bark being separated from the wood, no connection of the leaves with the wood can be observed; and the bark alone, if put into water, produces leaves.

Lastly, in the generation or production of the flowers of plants, the exterior bark, or epidermis, would seem to proceed into the cups, the alburnum into the corolla, and the series of vessels into the other parts of them.

Plants are likewise found to be of very different kinds and qualities, in respect to their powers of bearing fruit, or of becoming prolific, as well as that of their differing in so many other particulars, as in their natures, modes of growth, and various other points of consequence.

Many of them have the male and female parts in the same individual flower, whence they are commonly denominated hermaphrodite plants; and there are others, which have the male and female flowers in a state of intermixture on the same stem or branch, as is the case with the cucumber and melon, as well as some other kinds of plants. Some have also the flowers all over them without any fruit being produced, while others of the same kind, at the same time, have flowers, and produce fruit, which afford the distinction of male and female plants. But as those of the female sort only produce fruit, those of the first mentioned kind are constantly considered to be of this nature.

A perfect knowledge of these circumstances is of great advantage in the business of practical gardening, as it can be applied to many useful purposes in providing fruit, as well as good seeds of different kinds.

Much of the labour and attention of the horticulturist is likewise employed in the raising and providing plants of the herbaceous kind, which are extremely numerous, and not a few of them of considerable importance, in the view of food, requiring to be cultivated and produced in a regular and constant manner. They differ greatly, however, in their natures and qualities, as well as in their management and means of production. There are some, which have but little stem, being chiefly of a leafy description; others, in which the same part is far more considerable, but of a fleshy, tender nature; and still others in which the stalks are tough, hard, and of rather a ligneous quality.

Whenever herbaceous plants of any of these kinds are to be raised, it is almost constantly done from the young plants, after they have had some little growth from the seeds, and are in a perfect condition in every respect. This method is pursued in all the different kinds of cabbages, cauliflowers, brocolies, and lettuces, as well as with endive, celery, and many others. But there are some which are raised from seeds without being transplanted in the above manner, and a few from offsets or slips, and by dividing the roots or other parts.

In the shrubby and tree kinds, the plants are mostly increased from seeds, cuttings, layers, and slips.

All plants possess, by means of their living principles, the proper and necessary degrees of heat, by which they vegetate, increase, and are enabled to resist the overabundant cold or heat, which may at any time surround them; but they differ very materially in this respect, some having a much greater power of doing it than others. There are some which have also a remarkable capability of resisting cold in their roots; and others, which are equally remarkable in resisting heat. The kidney bean is an example of the former kind, and that of the cucumber of the latter: for if a green leaf of the former vegetable be introduced into the frozen juice of spinach, it quickly becomes thawed; and if a vessel full of water be exposed in a bed of cucumbers, the water speedily becomes warm, but the cucumbers remain cold to the touch; and if one be eaten the stomach is found to be cooled, as if it had taken ice. And the same thing has been found in respect to fruits, while growing upon the trees. The state of heat in plants would therefore seem to proceed from the matter of heat, which is taken from the surrounding air; and hence it is, that the shades of all sorts of trees are so cooling in their nature.

**PLANTS, Fossile.** Many species of tender and herbaceous plants are found at this day, in great abundance, buried at considerable depths in the earth, and converted, as it were, into the nature of the matter they lie among; fossile wood is often found very little altered, and often impregnated with substances of almost all the different fossile kinds, and lodged in all the several strata, sometimes firmly imbedded in hard matter, sometimes loose: but this is by no means the case with the tenderer and more delicate subjects of the vegetable world. These are usually immersed either in a blackish slaty substance, found lying over the strata of coal, or else in loose nodules of ferruginous matter of a pebble-like form, and they are always altered into the nature of the substance they lie among: what we meet with of these are principally of the fern kind: and what is very singular, though a very certain truth, is, that these are principally the ferns of American growth, not those of our own climate. The most frequent fossile plants are the polypody, spleenwort, osmund, trichomanes, and the several larger and smaller ferns; but beside these there are also found pieces of the equisetums, or horse-tails, and joints of the stellated plants, as the elvers, madder, and the like; and these have been too often mistaken for flowers; sometimes there are also found complete grasses, or parts of them, as also reeds and other watery plants; sometimes the ears of corn, and not unfrequently the twigs or bark, and impressions of the bark, and fruit of the pine or fir kind, which have been, from their scaly appearance, mistaken for the skins of fishes; and sometimes, but that very rarely, we meet with mosses and sea-plants.

Many of the ferns not unfrequently found, are of very singular kinds, and some species yet unknown to us; and the leaves of some appear set at regular distances, with round protuberances and cavities. The stones which contain

these plants split readily, and are often found to contain, on one side, the impression of the plant; and on the other the prominent plant itself: and, beside all that have been mentioned, there have been frequently supposed to have been found with us ears of common wheat, and of the maize or Indian corn; the first being in reality no other than the common endmost branches of the firs, and the other the thicker boughs of various species of that and of the pine kind, with their leaves fallen off; such branches in such a state cannot but afford many irregular tubercles and papillæ, and, in some species, such as are more regularly disposed.

These are the kinds more obvious in England; and these are either immersed in the slaty stone which constitute whole strata, or in flattened nodules, usually of about three inches broad, which readily split into two pieces on being struck.

They are most common in Kent, on coal-pits, near Newcastle, and the forest of Dean, in Gloucestershire; but are more or less found about almost all our coal-pits, and many of our iron-mines.

Though these seem the only species of plants found with us, yet in Germany there are many others, and those found in different substances. A whitish stone, a little harder than chalk, frequently contains them; they are found also often in a grey slaty stone, of a firmer texture, not unfrequently in a blackish one, and at times in many others; nor are the bodies themselves less various here than the matter in which they are contained; the leaves of trees are found in great abundance, among which those of the willow, poplar, whitethorn, and pear-trees, are the most common; small branches of box, leaves of the olive-tree, and stalks of garden thyme, are also found there; and sometimes ears of the various species of corn, and the larger as well as the smaller mosses in great abundance.

These seem the tender vegetables, or herbaceous plants, certainly found thus immersed in hard stone, and buried at great depths in the earth: others of many kinds there are also named by authors; but as in bodies so imperfect, errors are easily fallen into, these seem all that can be ascertained beyond mere conjecture. Hill's Hist. of Fossils. See PETRIFICATION.

**PLANTS, Marine.** See SEA-PLANTS.

**PLANUM, Os,** in *Anatomy*, the smooth orbital plate of the ethmoid bone. See CRANIUM.

**PLAPPERT,** in *Commerce*, a money of account in Switzerland; 15 plapperts, or skillings, being = 12 groschen, or gros, = 10 Swiss batzes = 9 good batzes = 1 livre, and containing 36 creutzers = 90 rappen = 180 pfenings.

**PLAQUET,** in *Ancient Armour*, a plate which was occasionally added to the breast-plate, in order to strengthen it.

**PLAS,** in *Biography*, two brothers, born in Spain, celebrated performers on the hautbois, who, like the two Bezozzis of Turin, always lived, practised, and performed together, as one and the same being. They left Madrid in 1752, and arrived at Paris the same year, where their performance excited equal wonder and extacy. Their tone, expression, taste, and execution, were as exactly similar as double stops on the same instrument.

In 1761 they went into Germany, and were engaged in the chapel of the duke of Wirtemberg, and in his household as chamber musicians.

**PLASCHKEN,** in *Geography*, a town of Prussian Lithuania; 9 miles N.W. of Tilit.

**PLASEMBURG,** a town of Transylvania, near Hermannstadt.

**PLASENCIA,** or **PLACENCIA,** a town of Spain, in the province of Guipuscoa; 20 miles N. of Vittoria.

**PLASENCIA,**

**PLASENCIA**, a town of Spain, in the province of Estramadura, situated in the middle of mountains, in a narrow valley, tolerably fertile, nine leagues long, and watered by the river Xerte. The town stands on the banks of this river, and is partly surrounded by it, as if in a peninsula. Its situation is also embellished by an agreeable promenade. Plasencia is a suffragan of San Jago, and its diocese comprehends a cathedral, chapter, and 152 parishes. This town is the chief place of a corregidoret, and contains seven parish churches, three convents of monks, and several chapels or oratories. Here is a fine aqueduct, which conveys water from the distance of two leagues, and has upwards of 80 arches; 95 miles W.S.W. of Madrid. N. lat. 40° 3'. W. long. 5° 9'.

**PLASH**, in *Rural Economy*, the bough or stem which is laid down by means of a nick or cut being made on the upper side of it, in repairing or restoring old hedge-fences.

**PLASHER**, a person of the labouring kind, whose business is the making or repairing of hedge-fences by means of plashing.

**PLASHING** of hedges, the operation or process by which this sort of work is performed in restoring old run up open hedges. The usual mode of executing it is as follows; the stronger stems are selected, at as regular distances as possible, and generally at about thirty inches apart. These are called the stakes; and are commonly headed over at four or five feet above the surface, according to the general strength of the hedge in question, so as they may all range in line, and at one height. The more pliable branches and small twigs are interwoven, in the basket manner, among the stakes, from top to bottom, as closely as possible. Such as will not bend in a pliable manner, and afterwards remain in due position, are snapped half through with the bill, to make them more obedient. The strong stems that cannot be laid in, and are not wanted for stakes, are cut close by the surface. In places where stems strong enough, and fit for stakes, are wanting, the deficiency is supplied by dead stakes. After the plashing is finished, the hedge is dressed smooth on both sides with the bill, or some other similar instrument. This is a method that is much practised in Hertfordshire and some other counties. See **FENCE**.

The principal objection to this mode, which is certainly the cheapest and most easily performed, is, that the stakes, or cut-over stems, shoot forth strongly to the detriment of the under part of the hedge, which, by over-shadowing, they retard in growth, and keep naked of spray; and which probably suggested an improvement, which is that of cutting none over at all, but weaving in the tops of the stakes along with the plashes. The propriety of this mode is at once evident; for, besides that the above complaint cannot possibly attach, the stems cut by the surface send up a strong growth, which, intermixing with the plashes, renders the whole more close and impenetrable than would otherwise be the case.

In cases where two rows of quicks have been planted, according to the common method, at the distance of a foot from each other, the *back* row being plashed in some of the above modes, and the front one being cut down to the stub, would be the most effectual method of preserving the present, and producing a new fence. It is, however, conceived, that this operation can only be effectually and *handsomely* performed in cases where there is a good portion of spray and long pliable shoots or branches; and when the edge has, if not youth, at least vigour on its side, to send forth a luxuriant growth, and cover the naked appearance the plashes would otherwise have. And that for the more handsome performance of this business, there is also a season

more suitable than another, which is the fall, or beginning of winter, as at this season the shoots are more pliable than in spring, when the sap begins to rise and circulate; at which time the shoots of all plants are most brittle. After the hedge is plashed, the ditch, provided there be one, should be scoured out, and dressed up; and that where the fence is properly attended to, in regard to pruning and cutting, it may last for many years.

The manner of executing this sort of work in the Hertfordshire mode has been fully explained in speaking of the nature of restoring fences.

This sort of practice is sometimes necessary to be had recourse to in gardens where the outward fences have been suffered to run up in rude growth, naked and open at the bottoms; they being reformed and reduced to order by proper trimming, thinning, cutting, and laying down the general stems and branches in a slanting manner lengthways, according to the ranges of the hedges, being interwoven between other stems which are left upright; the work being assisted by suitably nicking, cutting, or gashing the different parts on their upper sides; and the whole of the smaller lateral branches being plashed in, so as to close all the lower vacancies, and thicken every part regularly from the bottom to the top, to the height of from three to four feet, or a little more, according to circumstances.

This process is occasionally performed to any kind of deciduous common hedges, such as those of white-thorn, black-thorn, elm, poplar, beech, or other sorts; and in proceeding in the work, it is frequently necessary, especially in very disorderly rough edges, previously to trim or lop off much of the outward and over-growing rude branches of them, as well as the large naked wood and obviously superabundant growths, both above and below; carefully bringing down such branches or other parts as are left in an exact and regular manner, plash after plash, until the whole business is finished.

**PLASM**, **PLASMA**, is sometimes used for a mould, wherein any metal, or such like running matter, which will afterwards harden, is cast to receive its figure.

**PLASO**, in *Botany*, Rheede Hort. Mal. v. 6. 29. t. 16, 17, is a very noble papilionaceous and leguminous shrub, or tree, referred by Lamarck to *Erythrina*, with the specific name of *monosperma*. Juslieu, Gen. 357, mentions it under that genus, with a hint, extremely well founded, of its probably constituting a new one. Of this the celebrated Danish botanist, Koenig, who gathered in India two species of the genus in question, was aware. He named it *Butea*, after that distinguished lover of botany, the first earl of Bute; either not knowing, or not recollecting, that another genus was called *Stuartia* by Linnæus, in honour of this nobleman, and was universally received under that denomination. Dr. Roxburgh has however published the *Butea*, and it is adopted by Willdenow, Sp. Pl. v. 3. 917, as well as in Ait. Hort. Kew. v. 4. 252, and by the late Rev. Mr. Wood, in our 5th vol. See **BUTEA**.

The name is altogether inadmissible on the ground above mentioned, one genus being abundantly sufficient to commemorate any one person whatever, nor has there ever been a similar example, among classical writers of the Linnæan school. *Butea* may nevertheless remain as a memorial of the late marchioness of Bute, who paid much attention to botany, and is mentioned as having introduced several plants from the gardens of Madrid, into those of England.

**PLASS**, in *Geography*, a town of Bohemia, in the circle of Rakonitz; 18 miles S.W. of Rakonitz.

**PLASSEY**, a town of Hindoostan, in Bengal, near

which colonel Clive defeated the troops of Surajah Dowlah in 1757; 25 miles S. of Moorshedabad.

**PLASTER**, or **PLAISTER**, in *Building*, a composition of lime, sometimes with hair, sometimes with sand, &c. to parget or cover the nudities of a building.

There is also a plaster of a coarser sort than the plaster of Paris, which is sometimes used in this country for floors in gentlemen's houses, and for corn-granaries: it is made of a blueish stone, taken out of quarries, which are generally at the side of a hill, much like the stone of which Dutch terraces is made: the stone is burnt like lime, becomes white by burning, and when mixed with water, does not ferment like lime: when cold, it is beat into a fine powder; and when it is used, the quantity of about a bushel is put into a tub, and water applied to it, till it becomes liquid: in this state it is well stirred with a stick, and used immediately; for in less than a quarter of an hour it becomes hard and good for nothing, as it will not bear being mixed a second time like lime. See **GYPNUM**, and **PLASTERING**.

**PLASTER**, in *Pharmacy*, an external application of a harder consistence than our ointments: these are to be spread according to the different circumstances of the wound, place, or patient, either upon linen or leather.

If the part upon which they are to be laid be naturally hairy, it must be shaved; but that they may stick the better, the natural shape of the part must be consulted, and the plaster spread and formed accordingly, either round, square, triangular, elliptical, in a lunar form, or in shape of the letter T. Some also are divided at both ends, and others are perforated in the middle: these last are of frequent use in fractures attended with a wound; for by this contrivance the wound may be cleansed and dressed without removing the plaster.

Indeed there is almost no part of the body which a plaster of one of those forms may not be made to serve for, if it be notched about the edges with a pair of scissars. See **EMPLASTRUM**.

The use of plasters is various; they are serviceable in securing the dressings, they also forward the maturation of the pus, agglutinate and heal wounds, unite broken bones, heal burns, alluage pain, and strengthen weak parts. In many instances they contain acrid and stimulating substances, and operate as rubefacients, or blisters.

The calces or oxyds of lead boiled with oils, unite with them into a plaster of a proper consistence, which makes the basis of several other plasters: but some of them owe their consistence to wax and resin; and others contain no oily or fatty matter whatever: in boiling these compositions, a quantity of hot water must be added from time to time, to prevent the plaster from burning and growing black; but this should be done with care, lest it cause the matter to explode.

Plasters should not adhere to the hand when cold; they should be easily spread when heated; and after they are spread they should remain tenacious and pliant; but they should not be so soft as to run when heated by the skin. All plasters become too consistent or brittle when long kept; but in this case, those which are unctuous may be remelted by a gentle heat, and some oil added to them. They are usually formed into rolls, each of which is wrapped in paper, and when used, they are melted, and spread on leather, calico, linen, or silk. Those that contain metallic oxyds ought to be melted by boiling water, for in a greater degree of heat the fatty matter is apt to reduce the oxyd.

**PLASTER**, *Adhesive*. See **EMPLASTRUM**.

**PLASTER**, *Ammoniac*, is formed by dissolving 5 oz. of

purified ammoniac in half a pint of acetic acid (distilled vinegar), and evaporating the solution in an iron vessel placed in a water bath; constantly stirring it till it acquire a proper consistence. This plaster, which is stimulant and resolvent, is applied to scrophulous humours, and white swellings, and sometimes over the scalp, in tinea capitis.

**PLASTER**, *Ammoniac, with Mercury*. See **EMPLASTRUM**.

**PLASTER**, *Anodyne*. See **EMPLASTRUM**, and **PLASTER of Opium**, infra.

**PLASTER**, *Aromatic*, is formed, according to the directions of the Dublin pharmacopœia, of frankincense, 3 oz.; yellow wax,  $\frac{1}{2}$  oz.; cinnamon bark in powder, 6 dr.; oil of pimenta and oil of lemons, of each 2 dr. Melt the frankincense and the wax together, and strain the mixture; when it thickens by cooling, mix with it the powder of cinnamon previously rubbed with the oils, and form them into a plaster. This plaster is an elegant stimulant, and applied to the region of the stomach in dyspepsia, and increased irritability of that viscus, allays pain and vomiting, and expels flatus. As the oils are very volatile, it must be spread by the thumb without being melted. It requires to be frequently renewed, and is not very adhesive.

**PLASTER**, *Assafœtida*, consists, by the Edinb. pharm., of plaster of semi-vitreous oxyd of lead, and assafœtida, of each two parts, and galbanum and yellow wax, of each one part. This plaster is sometimes applied over the umbilical region, in flatulence and hysteria.

**PLASTER**, *Blistering, Emplastrum Lyttæ* of the Lond. pharmac., is made by melting  $1\frac{1}{2}$  lb. of wax plaster with a pound of prepared lard, and after removing them from the fire, when the mixture is beginning to be solid, sprinkling in 1 lb. of blistering flies reduced to a very fine powder, and mixing the whole together. The *emplastrum Meibes vesicatorii*, olim, *emplastrum vesicatorium* of the Edinb. pharm., consists of mutton suet, yellow wax, resin, and blistering flies, of each equal weights. Reduce the insects to a fine powder, and mix them with the other articles, previously melted together, and removed from the fire. The *emplastrum cantharidis* of the Dubl. pharmac. is formed by melting purified yellow wax and mutton suet, of each a pound, and 4 oz. of yellow resin together, and a little before they concreate in becoming solid, sprinkling in 1 lb. of blistering flies in fine powder, and forming the whole into a plaster. (See **EMPLASTRUM**.) Blistering plasters should remain applied at least for twelve hours to raise a perfect blister; they are then to be removed, the vesicle is to be cut at the most depending part, and without removing the cuticle, the vesicated part is to be dressed with simple cerate, or spermaceti ointment; and the old cuticle allowed to remain until a new one is formed under it; when it peels off, and the whole is healed in the course of a few days. The application of these plasters is sometimes attended with strangury and bloody urine, from the absorption of the active principles of the insect, and the irritation of the kidneys and urethra; and this effect is much increased, if the blister be applied over an abraded surface, e. g. on the head after it has been immediately shaved, and also if the plaster has remained too long applied. To prevent strangury, it has been recommended to mix camphor with the blistering composition, but this has no good effect; it is better obviated by copious dilution with milk, or mucilaginous fluids, and fomentations of warm milk and water to the blistered part, after the removal of the plaster. When the head is to be blistered, it should be shaved at least ten hours before the plaster is applied; and in all cases it is expedient to interpose a piece of thin gauze between the vesicatory and the skin, wetted with vinegar, and applied smooth and very close over the plaster.

plaster. When the blistered part becomes a spreading sore, which is sometimes the case in irritable habits, the best local application is a warm emollient poultice, and bathing the denuded surface frequently with tepid milk and water; while at the same time cinchona bark is internally administered. See BLISTER.

PLASTER of *Spanish flies*, compound, of Edinb. pharm., is prepared of 18 parts of Venice turpentine; Burgundy pitch and blistering flies, of each 12 parts; yellow wax, 4 parts; subacetite of copper, 2 parts; white mustard seeds and black pepper, of each 1 part. Melt the Burgundy pitch and the wax, and add to them the turpentine; while these remain still warm, after being melted, sprinkle in the other ingredients reduced to fine powder, and mix them, stirring constantly, so as to form a plaster. This plaster is intended to raise a blister more quickly than the former, and is therefore adapted to cases of gout and cramps of the stomach, in which the effect of the blister must be almost instantly produced. Its operation is attended with much pain and pungent sense of heat; and it is apt to produce very unpleasant ulceration if allowed to remain too long applied.

PLASTER, *Cephalic*. See EMPLASTRUM *Cephalicum*.

PLASTER, *Common*. See EMPLASTRUM *Commune*.

PLASTER, *Cumin*. See EMPLASTRUM *è Cymino*. This plaster is stimulant and discutient; and is applied to the hypogastric region in flatulence and a cold feeling of the bowels, and to indolent tumours.

PLASTER, *Drawing*. See EMPLASTRUM *Attrahens*.

PLASTER of *Galbanum*, Compound, of the Lond. pharm., is composed of purified galbanum, 8 ounces; plaster of lead, 3 pounds; common turpentine, 10 drachms; and resin of the spruce fir powdered, 3 ounces. Having melted the galbanum and the turpentine together, mix in first the resin, and then the plaster of lead previously melted by a slow fire, and mix the whole together. The plaster of galbanum of the Dub. pharm. is prepared by adding to  $\frac{1}{2}$  lb. of galbanum melted by heat, 2 lbs. of litharge plaster, and 4 oz. of yellow wax sliced; and then melting the whole together by a gentle heat.

PLASTER, *Gum*, of Edinb. ph., is composed of 8 parts of plaster of semi-vitreous oxyd of lead, and ammoniac gum-resin, galbanum, yellow wax, of each 1 part. See EMPLASTRUM *Gummi*.

These plasters are stimulant and suppurative. They are applied with advantage to serophulous tumours; to joints which have been long affected with arthritic pains; and to the loins in rickets. As a suppurative, they are applied to indolent tumours, and to reduce the induration which often remains round abscesses, after they are discharged.

PLASTER, *Mercurial*. (See EMPLASTRUM *commune cum Mercurio*.) The Edinb. pharm. directs it to be prepared of olive oil and resin, of each 1 part; mercury, 3 parts; plaster of semi-vitreous oxyd of lead, 6 parts; rub the mercury with the oil and the resin, previously melted together and cooled, until the globules disappear; then add gradually the plaster of semi-vitreous oxyd of lead melted, and let the whole be carefully mixed together. These plasters are powerful discutients, and are applied to buboes, venereal tumours, nodes when they are not very painful to the touch, and indurations; they are also applied to joints affected with obstinate syphilitic pains.

PLASTER of *Opium*, consists of hard opium powdered,  $\frac{1}{2}$  oz.; resin of the spruce fir powdered, 3 oz.; lead plaster, 1 lb.: melt the plaster and the resin together, then add the opium, and mix the whole. This plaster is said to be anodyne, and useful in relieving rheumatism and local pains.

PLASTER of *red oxyd of Iron* of Edin. pharm., formerly

*strengthening plaster*, is composed of plaster of semi-vitreous oxyd of lead, 24 parts; resin, 6 parts; yellow wax and olive oil, of each 3 parts; and red oxyd of iron, 8 parts; rub the red oxyd of iron with the oil, and add the other ingredients melted.

PLASTER of *Frankincense* of Dubl. pharm. is formed of litharge plaster, 2 lbs.; frankincense,  $\frac{1}{2}$  lb.; and red oxyd of iron, 3 oz.; to the frankincense and plaster melted together add the oxyd, stirring them together so as to form a plaster. These plasters are supposed to be tonic; and are used in muscular relaxations, and weaknesses of the joints after sprains; but they act chiefly in affording a mechanical support to the parts. See EMPLASTRUM *Roborans*.

PLASTER, *Compound pitch*, is composed of dried pitch, 2 lbs.; frankincense, 1 lb.; yellow resin and yellow wax, of each 4 oz.; and expressed oil of nutmeg, 1 oz. To the pitch, resin, and wax, melted together, add first the frankincense, then the oil of nutmeg, and mix the whole. This plaster is stimulant and rubefacient. It is used in catarrh, and other pulmonary affections, applied to the thorax; and in head-ache, and chronic ophthalmia, applied to the temples. When a serous exudation takes place, the plaster should be frequently renewed.

PLASTER, *Head*, is prepared by boiling together over a slow fire, of semi-vitreous oxyd of lead, rubbed to a very fine powder, 5 lbs.; olive oil, a gallon; water, 2 pints, stirring constantly until the oil and oxyd of lead cohere into the consistence of a plaster. It is necessary, however, to add a little boiling water, if the whole of that which was employed at first shall be consumed before the end of the process.

PLASTER of *semi-vitreous oxyd of Lead*, formerly *common plaster*, is prepared of the semi-vitreous oxyd of lead, 1 part; and olive oil, 2 parts; having added some water, boil them, stirring constantly, until the oil and the oxyd unite into a plaster. See EMPLASTRUM.

PLASTER, *Litharge*, of Dub. ph., is prepared by mixing 5 lbs. of litharge in fine powder; 9 lbs. of olive oil, and 2 pints of boiling water, at a high temperature, constantly stirring until the oil and the litharge unite so as to form a plaster, supplying occasionally any waste of water that may take place. These plasters are intended chiefly to defend excoriated surfaces from the action of the air, and to form the basis of some other plasters.

PLASTER, *Resin*, is formed of yellow resin,  $\frac{1}{2}$  lb., and lead plaster, 3 lbs.; melt the lead plaster by a gentle heat; then add the resin in powder and mix.

PLASTER, *Resinous*, formerly *adhesive plaster*, is composed of plaster of semi-vitreous oxyd of lead, 5 parts, and resin, 1 part.

PLASTER with *Resin*, *Litharge*, is formed by melting  $3\frac{1}{2}$  lbs. of litharge plaster by a moderate heat, and adding  $\frac{1}{2}$  lb. of yellow resin finely pulverized, that it may melt quickly, and form a plaster. (See EMPLASTRUM *Adhæsivum*.) These plasters are defensive, adhesive, and gently stimulant; they are used for retaining together the lips of recent wounds, when it is proposed to heal them by the first intention; to give support to ulcerated parts; and to assist their granulation and cicatrization.

PLASTER, *Soap*. (See EMPLASTRUM *Saponis*.) The soap plaster of the Edinb. pharm. is composed of 4 parts of semi-vitreous oxyd of lead; 2 parts of gum plaster, and 1 part of soap sliced. Mix the soap with the plasters melted together; then boil them a little so as to form plaster. Soap plaster is discutient, and is applied to lymphatic tumours; but it is much less useful than the mercurial plaster.

PLASTER, *Stomachic*. See EMPLASTRUM *Stomachicum*.

PLASTER,

**PLASTER, Warm**, is made by melting together, over a gentle fire, one ounce of gum plaster, and two drachms of blistering plaster; or one part of plaster of cantharides, and seven parts of Burgundy pitch, according to the Dublin pharmacopeia. This is useful in catarrh, hooping-cough, the sciatica, and other fixed pains of the rheumatic kind. It ought, however, to be worn for some time, and to be renewed, at least, once a week.

**PLASTER, Wax**, is formed by melting together of yellow wax and of prepared suet, of each three pounds; and yellow resin a pound; and then straining. The *simple plaster*, formerly *wax plaster* of Edinburgh pharmacopeia, is formed of yellow wax, three parts; mutton suet and resin, of each two parts. These were generally used instead of the melilot plaster, as a proper application after blisters, and in other cases where a gentle digestion is necessary; but on account of the pain and irritation they occasion, they are now seldom employed.

**Plaster of Paris**, is a fossile stone, serving many purposes in building; and used likewise in sculpture, to mould and make statues, basso relievos, and other decorations in architecture.

It is dug out of quarries, in several parts of the neighbourhood of Paris; whence its name. The finest is that of Montmartre. See GYPSUM.

Plaster of Paris, among our workmen, is of two kinds, *viz. crude*, or in the stone, and *burnt*, or beaten.

The *crude* is the native plaster, as it comes out of the quarry; in which state it is used as shards in the foundations of buildings.

The *burnt* plaster is a preparation of the former, by calcining it like lime in a kiln or furnace, and then beating it into powder, and diluting and working it. In this state it is used as mortar, or cement, in building.

This, when well sifted, and reduced into an impalpable powder, is used also to make figures, and other works of sculpture; and is, besides, of some use in taking out spots of grease, &c. in stuffs and silks.

The method of representing a face truly in plaster of Paris is this: the person, whose figure is designed, is laid on his back, with any convenient thing to keep off the hair. Into each nostril is conveyed a conical piece of stiff paper, open at both ends, to allow of respiration. These tubes, being anointed with oil, are supported by the hand of an assistant; then the face is lightly oiled over, and the eyes being kept shut, alabaster fresh calcined, and tempered to a thinish consistence with water, is by spoonfuls nimbly thrown all over the face, till it lies near the thickness of an inch. This matter grows sensibly hot, and in about a quarter of an hour hardens into a kind of stony concretion; which being gently taken off, represents, on its concave surface, the minutest part of the original face. In this a head of good clay may be moulded, and therein the eyes are to be opened, and other necessary amendments made. This second face being anointed with oil, a second mould of calcined alabaster is made, consisting of two parts joined lengthways along the ridge of the nose; and herein may be cast, with the same matter, a face extremely like the original.

If finely powdered alabaster, or plaster of Paris, be put into a basin over a fire, it will, when hot, assume the appearance of a fluid, by rolling in waves, yielding to the touch, steaming, &c., all which properties it again loses on the departure of the heat; and being thrown upon paper, will not at all wet it, but immediately discover itself to be as motionless as before it was set over the fire; whereby it appears, that a heap of such little bodies as are neither

spherical, nor otherwise regularly shaped, nor small enough to be below the discernment of the eye, may, without fusion, be made fluid, barely by a sufficiently strong and various agitation of the particles which compose it; and, moreover, lose its fluidity immediately upon the cessation thereof.

Two or three spoonfuls of burnt alabaster, mixed up thin with water, in a short time coagulate, at the bottom of a vessel full of water, into a hard lump, notwithstanding the water that surrounded it. Artificers observe, that the coagulating property of burnt alabaster will be very much impaired or lost, if the powder be kept too long, especially if in the open air, before it is made use of; and when it hath been once tempered with water, and suffered to grow hard, they cannot, by any burning or powdering of it again, make it serviceable for their purpose as before. Boyle's Works Abr. vol. i. p. 133. 313. 341.

This matter, when wrought into vessels, &c. is still of so loose and spongy a texture, that the air has easy passage through it. Mr. Boyle gives an account, among his experiments with the air-pump, of his preparing a tube of this plaster, closed at one end and open at the other, and on applying the open end to the cement, as is usually done with the receivers, it was found utterly impossible to exhaust all the air out of it; for fresh air from without pressed in as fast as the other, or internal air, was exhausted, though the sides of the tube were of a considerable thickness. A tube of iron was then put on the engine; so that being filled with water, the tube of plaster of Paris was covered with it; and on using the pump, it was immediately seen, that the water passed through into it as easily as the air had done, when that was the ambient fluid. After this, trying it with Venice turpentine instead of water, the thing succeeded very well; and the tube might be perfectly exhausted, and would remain in that state several hours. After this, on pouring some hot oil upon the turpentine, the case was much altered; for the turpentine melting with this, that became a thinner fluid, and in this state capable of passing like water into the pores of the plaster. On taking away the tube after this, it was remarkable that the turpentine, which had pervaded and filled its pores, rendered it transparent, in the manner that water gives transparency to that singular stone called *oculus mundi*. In this manner, the weight of air, under proper management, will be capable of making several sorts of glues penetrate plaster of Paris; and not only this but baked earth, wood, and all other bodies porous enough to admit water on this occasion. Phil. Transf. N<sup>o</sup> 122.

Plaster of Paris, diluted with water into the consistence of a soft or thin paste, quickly sets or grows firm, and at the instant of its setting, has its bulk increased; for Mr. Boyle has found, that a glass vessel, filled with the fluid mixture, and closely stopped, bursts while the mixture sets, and sometimes a quantity of water issues through the cracks.

This expansion of the plaster, in passing from a soft to a firm state, is one of its valuable properties; rendering it an excellent matter for filling cavities in foundry works, where other earthy mixtures would shrink and leave vacuities, or entirely separate from the adjoining parts.

It is probable also, that this expansion, of the plaster might be made to contribute not a little to the elegance of the impressions which it receives from medals, &c. by properly confining the soft matter, that its expansion may force it into the minutest traces of the figure; the expansion of the matter doing the same office as the pressure by which the wax is forced into the cavities of a seal.

Plaster of Paris promotes the fusion of forged iron.

This substance is commonly used for taking casts and impressions from figures, busts, medals, &c. as it is adapted to the double use of making both casts and moulds for forming them. See *Impressions of MEDALS*.

PLASTER of Paris, in *Agriculture*, a substance of the calcareous kind, in combination with the vitriolic acid, which has been sometimes made use of as a manure. See GYPSUM and *Sulphate of LIME*.

PLASTER, in *Gunnery*, a piece of greased leather or rag, used by riflemen, &c. to make the ball fit the bore of the piece.

PLASTER Floors, in *Rural Economy*, such floors as are constituted of plaster, prepared from such lime as possesses a strong binding property. They are highly useful in cottages and farm-houses, as affording much security against fire. In constructing them, it is observed, in the first volume of Communications to the Board, that the joists are laid in the usual manner; after which a sort of strong reed, which is found in Huntingdonshire, is nailed on, upon which the plaster is applied; but in order to save it, there is frequently a thin coat of common lime laid on first, to fill up the crevices and inequalities. On this the plaster is then spread out, to the thickness of about two inches, being laid on with as much expedition as possible. The plaster is sold at the kilns in the midland districts, at 6*d.* the bushel: and the expence of laying it on, if burnt and prepared, is 5*d.* the square yard; but if to be burnt and prepared by the workmen, about as much more. The floors are said to be excellent and cheap. Where reeds cannot be procured, laths may be made use of, but they come much higher. Floors of this sort are much in use in Nottinghamshire, as well as in Rutlandshire, at the earl of Winchelsea's, where the upper floors of his farm-houses are made of it.

These kinds of floors should be more attended to, in constructing small houses both of the cottage and other kinds, as being cheap, readily laid, and at the same time secure.

PLASTERING, in *Architecture*, is that operation which consists in laying on coats of mortar, variously prepared, on the ceilings and walls, &c. of different buildings. This belongs to a class of artificers called plasterers. See PLASTER.

Plasterers' work is of two kinds: namely, ceiling, which is plastering upon laths; and rendering, which is plastering upon walls. These are measured separately. The contents are estimated either by the foot, or yard, or square of 100 feet. Enriched mouldings, &c. are rated by running or lineal measure. Deductions are to be made for chimnies, doors, windows, &c. But the windows are seldom deducted, as the plastered returns at the top and sides are allowed to compensate for the window opening.

It were much to be wished that this art of plastering could be again brought to its ancient perfection. In our best buildings the plastered walls and ceilings crack and fly, and in a little time grow damp, or moulder to decay.

The Romans had an art of rendering their works of this kind much more firm and durable, and there is no reason to despair of reviving this art by proper trials.

The ancient plastering of these people preserved to this time, where it has not met with violent blows or injuries from accidents, is still found as firm and solid, as free from cracks or crevices, and as smooth and polished on the surface, as if made of marble. The bottoms and sides of the Roman aqueducts were made of this plastering, and endured many ages without hurt, unless by accidents: witness that whereof some yards are still to be found on the top of the Pont de Gard, near Nismes, for the support of which that

famous bridge was built to carry water to the said town. The roofs of houses, and the floors of rooms, at Venice are covered with a sort of plaster, made of later date, and yet strong enough to endure the sun and weather for several ages, without cracking or spoiling, and without much injury from people's feet.

The secret of preparing this Venetian plaster is not among us; but it would be worth while to try whether such a substance might not be made by boiling the powder of gypsum dry over the fire, for it will boil in the manner of water; and when this boiling or recalcining was over, the mixing with it resin, or pitch, or both together, with common sulphur, and the powder of sea-shells. If these were all mixed together, and the water added to it hot, and the matter all kept hot upon the fire till the instant of its being used, so that it might be laid on hot, it is possible this secret might be hit upon.

Wax and oil of turpentine may be also tried as additions; these being the common ingredients in such cements as we have accounts of as the firmest. Strong ale-wort is by some directed to be used, instead of water, to make mortar of limestone of a more than ordinary strength. It is possible, that the use of this tenacious liquor to the powdered ingredients of this proposed plaster, might greatly add to their solidity and firmness. Phil. Trans. N<sup>o</sup> 93. See STUCCO.

PLASTIC, Πλαστικός, from πλαστω, of πλαττω, or πλασσω, *plango, I fashion, form, &c.* imports as much as *formative*, or a thing endued with a faculty of forming or fashioning a mass of matter after the likeness of a living being.

Some of the ancient Epicureans, and perhaps the Peripatetics too, imagine a plastic virtue to reside in the earth, or at least to have anciently resided therein; and that it was by means of this, and without any extraordinary intervention of a Creator, that it first put forth plants, &c. Nay, some of them, whether seriously or not we do not undertake to determine, taught that animals, and even man, were the effects of this plastic power.

Some learned modern writers have strenuously contended for the doctrine of a plastic nature, which they have described to be an incorporeal created substance, endued with a vegetative life, but not with sensation or thought, penetrating the whole created universe, being co-extended with it, and, under God, moving matter so as to produce the phenomena, which cannot be solved by mechanical laws; active for ends unknown to itself, not being conscious of its own actions, and yet having an obscure idea of the action to be entered upon. Dr. Cudworth reasons thus: since neither all things are produced fortuitously, or by the unguided mechanism of matter, nor God himself may reasonably be thought to do all things immediately and miraculously, it may well be concluded, that there is a plastic nature under him, which, as an inferior and subordinate instrument, doth drudgingly execute that part of his providence, which consists in the regular motion of matter; yet so as that there is also, besides this, a higher providence to be acknowledged, which, presiding over it, doth often supply the defects of it, and sometimes over-rule it; for as much as this plastic nature cannot act electively, nor with discretion. This doctrine, he says, hath had the suffrage of the best philosophers of all ages. Aristotle, Plato, Empedocles, Heraclitus, Hippocrates, Zeno, and the Stoics, and the latter Platonists and Peripatetics, as well as the chemists and Paracelsians, maintained this doctrine.

“If an unintelligent agent,” says Dr. Price, “can act with such uniformity, and yet so variously, as to produce the order of the world, and govern its motions; if, for instance, it  
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can frame the bodies of plants and animals, or so direct its own action as to impel the particles of matter towards one another, in such different directions, and with such different forces in different situations, as to be the constant cause of those laws and powers which obtain in the corporeal universe, and on which depend its form and being; if, I say, this is possible, there is an end of all our reasonings about causes and effects, and of all arguments for design and intelligence in the author of nature, taken from its regularity and beauty. It avails nothing to say, that this agent acts in subordination to the deity, and only in virtue of powers given it by him. For it is not supposed to be merely an instrument in the hands of the deity, which never acts except in consequence of being first acted upon; but what it does, it is supposed to do properly by a power inherent in itself, without wanting any immediate direction from the deity; and the very reasons that have been assigned for supposing such an agent, are, that it is absurd to think that the deity should be continually employed so much in vain, as is necessary to be supposed, if the general laws of the world are derived from his agency; and that it is dishonouring him to conceive of him as acting himself continually on matter, and immediately concerned in framing the bodies of the meanest plants and insects. To as little purpose is it to say, that omnipotence can give such a power to an unintelligent agent: for what has not wisdom, cannot act wisely; and no power can make that to be, which cannot be. If the deity can make a cause that acts without knowledge or design to produce regular effects; then it is in the nature of things possible for such a cause to produce such effects; then design in the cause is not necessary to the greatest conceivable order and regularity in the effect, nor can we certainly infer the one from the other: then, in short, any thing may produce any thing, and no conclusion with respect to the cause can be drawn, in any case, from what we see in the effect.—The effects of habits have been very improperly alleged, as affording instances of regular action, without knowledge of design. For, what is done by habits, is, I think, always done in consequence of some volition or direction of the mind; and our not being conscious of it is in reality no more than not remembering it, the whole effect of a habit on the executive powers consisting in their more easy and ready compliance with the dictates of the mind. But not to insist on this; let it be granted that regular actions are frequently performed in consequence of habits, without thought or design: this, if true, must be owing to certain powers and laws of the animal economy, which must be accounted for in the same manner with other powers and laws which obtain in nature, and cannot be made an argument for such a blind plastic force as has been contended for, without begging the question. See the truly great and learned Dr. Cudworth's Intellectual System, book i. ch. 3, where the opinion on which I have made these remarks is particularly explained and defended. See also an account of a controversy which it occasioned between Mr. Bayle and Le Clerc, in the account of the life and writings of Dr. Cudworth, prefixed to the second edition of the Intellectual System by Dr. Birch. Dr. Henry More and Dr. Grew have likewise maintained this opinion." Intell. System, vol. i. p. 147, &c. Birch's ed. More's Imm. of the Soul, lib. iii. cap. 12. Price's Diff.

PLASTICE, Πλαστικη, the plastic art, a branch of sculpture; being the art of forming figures of men, birds, beasts, fishes, plants, &c. in plaster, clay, stucco, or the like.

The workmen concerned in this art are also called *plastæ*, πλασταί.

Plastice differs from carving, because here the figures are made by addition of something that is wanting; but in carving, always by subtraction of what is superfluous.

The plastic art is now chiefly used, among us, in fret-work ceilings; but the Italians apply it also to the mantlings of chimneys with great figures.

PLASTRON, in *Ancient Military Armour*, a breast-plate of forged iron occasionally put on, under or between the hauberk and gambeson.

PLASTRON is also a piece of leather stuffed, used by fencing-masters, on which to receive the pushes made at them by their pupils.

PLASWIG, in *Geography*, a town of Prussia, in the province of Ermeland; 28 miles N.W. of Heilsberg.

PLAT, a popular term, among *Mariners*, &c. for a sea-chart.

PLAT, in *Rural Economy*, a term provincially applied to the mould-board of a plough.

PLAT-*Veins*, in the *Manege*, called in French *ars*, are the veins in which we bleed horses, one in the lower part of each shoulder, when we bleed a horse in the shoulders; and in the flat part of the thighs.

PLATS, in a *Ship*, flat ropes made of rope-yarn, and twisted into *foxes*; they serve to save the cable from galling in the hawse, or to wind about the flukes of the anchors, to save the pennant of the fore-sheet from galling against them.

PLATA, PLATE, in *Commerce*, a Spanish term, signifying silver; as vellon, which they pronounce vellion, signifies copper. These two terms are not only used to express the species of those metals struck in Spain, but also to distinguish between their several monies of account. Plate is reduced to vellon by saying, as 17 is to 32, so is the given plate to the vellon sought; and *vice versa*. See EXCHANGE; see also MARAVEDI and REAL.

PLATA, *La*, or *Buenos Ayres*, in *Geography*, a vice-royalty belonging to the Spanish dominions in South America, erected in 1778 (not in 1776, as stated under the article *Buenos Ayres*, from authorities to which we had then access), is one of the most important divisions, and that by which the chief opulence of the Spanish dominion in this part of the world passes to the parent country, and is interwoven with the commerce and interests of Europe. Including the savage Chiquitos and Mojos in the north, and extending to the southern limits of Tuyu and the wide plains called the Pampas, its length from the chain of Vilcanota to the vicinity of the river Negro, may be assumed from 14 S. lat. to near 38°, that is 24°, or 1440 geographical miles. Estalla itates the boundary between La Plata and Peru to be now the cordillera of Vilcanota, dividing the province of Carabaya in La Plata from that of Canes and Canches in Peru.

The breadth of La Plata, which is generally pretty equal, may be computed at 12°, or 720 geographical miles. Estalla, cited by Pinkerton, computes the extent at 1000 Spanish or rather American leagues (seeming vaguely to include Chili), and the greatest breadth at 350, forming a triangle of 1000 leagues in height, on a base of 350, equal to 175,000 square leagues; which, as he adds, might support 50,000,000 persons, while in fact there is scarcely one million of civilized inhabitants, and some few savages. Before the establishment of this vice-royalty, the greatest part of the jurisdiction belonged to that of Peru; although the three provinces of Buenos Ayres, Paraguay, and Tucuman, were considered as "Capitanias Generales," that is, the governors had an authority independent of the viceroys of Peru, except in cases of great importance and difficulty.

The

The part of Peru now annexed to La Plata was divided into well-known provinces or districts; and the missions of the Chiquitos, Mojos, and Guaranis, formed three distinct governments. The form of government in this new vice-royalty remained the same, though its title was changed. The ordinance of his Catholic majesty for the sub-division of the vice-royalty was issued in 1782, and appointed nine intendancies. Estalla says that this vice-royalty is divided into nine intendancies, namely Buenos Ayres, comprising the whole of that bishopric; the bishopric of Tucuman embracing two intendancies, that of Salta, and that of Cordova, to which is joined the province of Cuyo-y Mendoza, which, with regard to spirituals, is subject to the bishopric of Chili: in former Peru, there are five intendancies, Potosi, Plata, Puno or Paucarcola, La Paz, and Cochabamba on the S.E. of La Paz; and from the remaining description, which is rather confused, it would appear that Santa Cruz de la Sierra forms the ninth intendancy; but there is also an intendant of Paraguay.

Mr. Pinkerton, for the purpose of a geographical description of this vice-royalty, enumerates the principal provinces, proceeding from the south, which are as follow:

- |                         |                              |
|-------------------------|------------------------------|
| 1. Pampas,              | 16. Plata,                   |
| 2. Tuyu,                | 17. Santa Cruz de la Sierra, |
| 3. Buenos Ayres,        | 18. Chayanta,                |
| 4. Cordova,             | 19. Oruro and Paria,         |
| 5. Cuyo and Mendoza,    | 20. Carangas,                |
| 6. Charcas,             | 21. Pacajes,                 |
| 7. Guaramia,            | 22. La Paz,                  |
| 8. Paraguay,            | 23. Cochabamba,              |
| 9. Chaco,               | 24. Sicalica,                |
| 10. Salta,              | 25. Laricaja and Omafuyos,   |
| 11. Jujuy,              | 26. Chucuito,                |
| 12. Chichas and Tarija, | 27. Puno or Paucarcola,      |
| 13. Lipes,              | 28. Lampa,                   |
| 14. Atacama,            | 29. Afangaro,                |
| 15. Potosi or Porco,    | 30. Carabaya, which is the   |

last province of La Plata on the N. of the great lake of Titicaca, separated from the Peruvian province of Canes and Canches by the grand chain of the cordillera called Vilcanota.

Estalla has briefly described the upper and inferior parts of the vice-royalty, as he calls them. The former part is peculiarly rich in the precious metals, yielding only to Mexico in this respect, and he particularly mentions the cordillera of Lipes; and to Porco belong the celebrated mines of Potosi. The metals of Oruro and Paria are also celebrated. The provinces most rich in gold are Laricaja and Carabaya; while those that produce the greatest quantity of silver are Lampa, Puno, Chucuito, Oruro, Chayanta, and Chicas, not to mention Potosi. Carangas and Pacajes are famous for the breed of pacos, which are used as beasts of burden. Lampa and Afangaro are noted for the produce of wool, the sheep in the former being estimated at near a million. These districts, together with Chucuito, also rear cattle and horses. In the provinces of Salta and Jujuy mules form a prodigious article of trade, supposed to yield 200,000 dollars annually. Cochabamba produces abundance of wheat and maize, so as to supply Oruro, La Paz, and other upland provinces. Santa Cruz de la Sierra, which ranks among the warm regions beneath the chain of mountains, trades in honey, fugar, and beer. In the lower part of the vice-royalty, Estalla observes that the province of Buenos Ayres comprehends three other cities besides the capital, namely, Montevideo, Corrientes, and Santa Fé. The chief products of this province are beeves and mules. For an account of Buenos Ayres, we refer to that article; here

adding some particulars which have come to our knowledge since that article was written. In consequence of the creation of the new vice-royalty, there has been a great increase of commerce and agriculture, and many other advantages have contributed to its progressive prosperity. Formerly its inhabitants had no country-houses, nor any other fruits than a kind of peach; but now every person in easy circumstances has a country cottage and garden, with a variety of fruits, garden plants, and flowers. The houses, though not elevated, are convenient and well furnished. The women are celebrated among the most beautiful in America; and though their dress is less expensive than that of those of Lima, it is more agreeable and elegant. The cathedral has been lately rebuilt; it has three naves, besides several chapels; and in 1798 it had cost half a million of dollars, and the expense of completing it would be as much more. A college is opened, that of San Carlos, which is said to contain 100 students. The ecclesiastical establishment consists of a bishop and some dignitaries; the parish churches are six, and the convents are numerous. Here are two hospitals for orphan children, one of which receives foundlings; and here is also an asylum for women of the town, and in the vicinity are several hermitages and little chapels. The population, which is daily on the increase, is supposed to be about 40,000 persons, of whom the whites or Spaniards compose one half, the other half consisting of negroes, mulattoes, and some few Indians from other parts. Of the Spaniards, some are creoles, born in the country of white parents, and all are chiefly employed in commerce, the arts, and agriculture, while the people of colour are mostly servants. The merchants form the chief part of the population, and of these the greater number is composed of such as are not natives. The inhabitants of Buenos Ayres are, according to Estalla, of a sedate turn, affable and polite. A theatre is established. Bull fights, which were formerly held in the great square, are abolished. Both sexes are handsome, having agreeable countenances, and wearing the Spanish dress. The ladies are fond of music, with which they amuse themselves and their company. Their stockings are fancifully embroidered with gold. The religious processions of this city are numerous and splendid. From Spain, and chiefly from Cadiz, are imported most of the necessaries, as silks, woollens, cotton, linen, hats, &c. They are debarked at Montevideo, and carried in boats to Buenos Ayres, whence they may pass to any part of the vice-royalty, paying 4 per cent. on the sale if carried to the frontier provinces, and 6 per cent. in other cases. The merchants are esteemed men of character and good credit. If Buenos Ayres were not the capital of the province, and at present the great mart of Peruvian commerce, its trade would be inconsiderable, because it has no great branch of native exportation. But the fertility of the neighbouring provinces may in time incline the balance in its favour; and the leather, wool, wheat, tallow, may yield considerable revenues to the vice-royalty. The market of Buenos Ayres is abundantly supplied with all kinds of plants, fruits, meat, bread, fish, fowl, milk, &c. Estalla says, that nearly 1000 head of cattle are slain in the neighbourhood for the daily use of the city: fish is also abundant; but clear water is wanting. The climate is less healthy than that of Montevideo, and the calentures or fevers are pernicious. The city is not deficient in coffee houses, confectionary shops, and taverns; but ice and snow are wanting. The viceroy is lodged in the fortrefs, in which are also the new royal audience, the royal treasury, the chapel, guard-house, and various magazines. The guild-hall is a large building, raised on pillars of brick, where the judges hold the sessions, and underneath

is the gaol. The environs, especially towards Cordova, are pleasant, being full of gardens and groves, diversified with fields of wheat and maize. Cattle are abundant. See BUENOS AYRES. For an account of Montevideo, Santa Fé, Corrientes, Potosí, La Paz, Mendoza, Cordova, Tucuman, Salta, Cuyo, Rioja, the Guaranis, Paraguay, the Pampas, Chucuito, Puno, Oruro, Santa Cruz, Jujuy; see the several articles.

The government of La Plata is entrusted to a viceroy, who has also the title of captain-general, with an assessor, and a fiscal, and also a secretary. The jurisdiction of the viceroy comprehends the whole political management, except the royal treasury, to which his authority does not extend. In the military department he is commander-in-chief under the sovereign. The assessor is also auditor, or supreme judge; and his military jurisdiction is that of captain-general of the veteran troops. The salary of the viceroy is 40,000 dollars; but after certain deductions the residue is about 30,000. He is nominated for three years. The salary of the assessor, fiscal, and secretary, is between 2 and 3000 dollars each. The viceroy is supreme president of the royal audience of Charcas, and also of the new royal audience, erected in 1785, at Buenos Ayres. He exercises the royal vice-patronage, and as such has a grand seat and canopy in the cathedral, where he is treated with the same ceremonies as are paid to the monarch. The royal treasury acknowledges as its chief the intendant of the army; he has a salary of 10,000 dollars; and he audits all the accounts of the vice-royalty. The essential branches of the administration of the royal treasury at Buenos Ayres are the customs, the deposits of tobacco, the monopoly of which has sometimes yielded 100,000 dollars a-year, playing cards and stamped paper, which are of little consequence. Similar duties are exacted in the principal cities of the vice-royalty, and 4 per cent. arises from the sale of merchandize. But the chief branch of the revenue is the duty called *quinto*, though in fact the *tercio* only of all metals. There is also a capitation tax from eight to ten dollars, paid by each person. However, the royal expenses are great: the pay of the military, the charges of the sales, and the salaries of the officers of the customs and of tobacco, are prodigious. The intendants of the provinces manage in their jurisdictions the administration of justice, of the police, of the revenues, and of war. In Paraguay, Tucuman, and Santa Cruz, they have joined the command of the troops. The governors intendants have a salary of 6000 dollars, and 600 for the expence of the secretariate and visiting their province. The intendant of Potosí, who is also director of the mint, and of the bank, has a salary of 10,000 dollars. The assessor, appointed by the king to assist these intendants in the administration of justice, has a salary of 1000 dollars, derived from the law-suits, and 500 from the treasury, those of the general intendency excepted, who have 1000.

Besides the nine intendancies there are four governments in the vice-royalty of La Plata, *viz.* that of Montevideo, political and military; and those of the Guaranis, Chiquitos, and Mojos, who have great power military and civil. The establishments on the Patagonian coast, and the Maluinas, or Falkland islands, are subject to particular instructions. Estalla computes the population of this extensive vice-royalty at 1,000,000 Spaniards or creoles, and an inconsiderable number of savages. The population of the other two vice-royalties, *viz.* Peru and New Granada, probably does not exceed 2½ millions. That of Caracas, by the account of Depons, amounts to 728,000, including whites, negroes, and Indians; and Chili

can scarcely exceed the number necessary to complete a million. Brazil, by the best accounts, contains 200,000 whites, and 600,000 negroes, while the natives are little more than sufficient to complete another million. The whole number, therefore, will yield 5½ millions; nor can more, it is thought, than 6 millions be allowed for the general population of the whole of South America.

The internal commerce of this vice-royalty is conducted by means of covered carts or small waggons drawn by oxen, and these form caravans for security against the attacks of the savages. The chief journies are from Buenos Ayres to Jujuy and Mendoza; beyond which stations it is necessary to have recourse to mules, as the country becomes mountainous. This trade supports many individuals, and increases the circulation of money. The freedom of trade, granted in 1778, contributed very much to augment the general commerce of La Plata; and by a royal ordinance of the 10th of April, 1793, it was permitted, that salted meat and tallow might pass to Spain, or the other colonies, free from duties; a privilege, which had before been granted to the trade in negroes, who were found necessary for the cultivation of the country.

The increase of commerce in this vice-royalty has had a beneficial effect on the agriculture of the country. A royal schedule, in 1791, granted to Spaniards and foreigners the right of introducing negroes, and instruments of agriculture; nor is it improbable, as our author (Estalla) conceives, that this wide and fertile vice-royalty may become, in a few years, not only the granary of the other Spanish colonies, but of the parent country, by the extreme fertility of its soil, and the excellent regulations that are adopted. The climate is singularly benignant, and the extent of fertile lands immense, watered by innumerable rivers and rivulets, which join the majestic waves of the Paraguay and the Parana. The farms, stations, and inclosures for breeding bees, horses, mules, sheep, &c. are already so numerous that they may be counted by millions. Salt rivers and lakes, with numberless creeks, afford convenience for loading boats with salted meat, and the natives are distinguished by their activity and industry. Some districts of the missions produce cotton, lint, and flax; and there are mines of gold at Maldonado and San Luis, 200 leagues from the capital. Although agriculture, fishery, the chase, and the mines serve to enrich these provinces, yet no object is more useful than the breeding of cattle, and we may form some judgment of the number by that of the skins imported. In 1792, 825,609 hides of bees were carried to Spain, besides those sent to the coast of Brazil, and for the purchase of negroes, &c.

The botany of the provinces of this vice-royalty, which formerly belonged to Peru, may be found in the Flora Peruana; and that of the central, southern, and eastern provinces, may be supplied from the work of the industrious Dobrizhoffer, who has, in his first volume, given a general natural history of Paraguay. For a sketch of the botany and zoology, see PARAGUAY.

The mines form a grand object in the new vice-royalty, and are found chiefly in the provinces formerly considered as Peruvian; for, in fact, Charcas, Tucuman, and Buenos Ayres, were all regarded as dependencies of Peru, before the grand change in the year 1778. The upper part of the vice-royalty of La Plata very justly deserves the appellation given to the vice-royalty, as it is the richest country in silver which has yet been discovered on the globe. The mines of gold and silver may be said to be innumerable. All the northern provinces teem with mineral opulence: while Laricaja and Carabaya are distinguished by virgin gold.

gold. (See POROSI.) Besides gold and silver, copper is found at Articoya near Oruro, and in the district of Lipés. A rich mine of tin is wrought in the district of Paria; and mines of lead abound in the province of Chichas.

The following is the state of the mines in the new viceroyalty of Buenos Ayres, as reported by Helms.

Provinces.	Gold.	Silver.	Copper Mines.	Tin.	Lead.
Tucuman - - -	2	1	2		2
Mendoza - - -		1			
Atacama - - -	2	2	1		1
Lipés } prov. of Potosí	2	1	1		1
Porco }	1	2	1		
Caracacas - - -		2	1		
Pacajes, or Benegueta		1			
Chucuyto - - -		2			
Paucarcolla, town Puno		1			
Lampa - - -		2			
Montevideo - - -	1				
Chichas and Tarija - -	4	5			1
Cochabamba - - -	1				
Sicaica - - -	2				
Laricaja - - -	4				
Omasuyos - - -	4				
Afangaro - - -	3				
Carabaya - - -	2	1			
Potosí - - -		1			
Chayanta - - -	2	3	1	1	1
Mizque - - -		1			
Paria - - -		1		1	1
Total	30	27	7	2	7

The same author has given the following statement of the whole coinage in Spanish America, from January 1, to December 31, 1790, taken from the official register.

	In Gold. Piafres.	In Silver. Piafres.	Total. Piafres.
At Mexico	628,044	17,435,644	18,063,688
At Lima	821,168	4,341,071	5,162,239
At Potosí	299,846	3,983,176	4,283,022
At Santiago Chili	721,754	146,132	887,886
Total	2,470,812	25,906,023	28,376,855

Pinkerton's Geography, vol. iii. ed. 1807.

PLATA, *La*, a province of the above described viceroyalty. Its capital of the same name was formerly a city of Peru and the see of an archbishop. It was built by captain Pedro Anzures in the year 1539, by order of Gonzalo Pizarro, on the site of Chuquisaca, and called Plata, in allusion to the silver mines of the mountain of Porco in its neighbourhood, from which the Incas obtained great quantities of silver. Its ancient name long prevailed, and, as Ulloa says, is now commonly used. This city stands on a small plain environed by eminences, which defend it from the winds. In summer the temperature of the air is very mild, nor is there any great difference throughout the year; but in winter, which here begins in September and continues till March, tempests of thunder and lightning are very common, and rain is of long continuance. The houses are covered with tile, having one story besides the ground floor; they are roomy and convenient, and have

delightful gardens planted with the fruits of Europe. Water is scarce. The inhabitants consist of Indians and Spaniards, and are said to amount to 14,000. The cathedral is large, of good architecture, and finely adorned with paintings and gildings. The parish is served by two priests, one for the Spaniards, and one for the Indians. Another parish, situated at one end of the city, is appropriated to the Indians living within its precinct, and amounting to about 3000. The convents of the Franciscans, Dominicans, Augustines, the fathers of Mercy, and the college of Jesuits, are spacious buildings, with splendid churches. Here are also two nunneries, and an university dedicated to St. Francis Xavier, the rector of which is always a Jesuit; and also two other colleges, in which lectures of all kinds are read. The magistracy consists of regidores, who are persons of the first distinction, with a corregidor at their head; from these are annually chosen two ordinary alcaldes for superintending the police. Plata was erected into a bishopric in 1551, and in the year 1608 was raised to a metropolis. The jurisdiction of this city includes the imperial town of Potosí, which see. Juan and Ulloa's Voyage, vol. ii. S. lat. 19° 40'. W. long. 66° 46'.

PLATA, *Rio de la*, or river of Silver, a river of South America, which is the conjunct flood of the Paraguay, the Pilcomayo, the Parana, and the Uruguay. The main streams are the Paraguay and the Parana, which see respectively. This river was first discovered by Juan Dias de Salis, in the year 1515, who sailed up the stream as far as an island, which lies in S. lat. 34° 40'. The mouth, nearly 60 leagues broad, is supposed to have been called La Plata from the great quantity of silver found by those who first visited the countries adjacent to its banks; though it was originally called the river Salis, from its first discoverer, who, observing some Indian tents as he sailed up the river, imprudently went on shore with ten men, who were all murdered by the savages. The river Plata, receiving considerable streams, sometimes swells to such a degree, that the banks on each side are overflowed, like those of Egypt by the inundation of the Nile, and thus rendered remarkably fertile. The current of the river, where it falls into the sea, is so rapid, that the water is fresh some leagues distant from its mouth. Its water is also clear, sweet, and wholesome. It abounds with great plenty and variety of fish; and its banks are frequented by a number of very beautiful birds. The distance from the conflux of the Paraguay and Parana to the mouth of the river is near 600 miles, and this interval is interspersed with delightful islands, and navigable by the largest ships. See PARANA.

PLATA, *La*, a small island in the Pacific ocean, near the coast of Peru. S. lat. 1° 10'.

PLATA, *La*, or *Sebastian del Oro*, a town of South America, in the province of Popayas; 60 miles E. of Popayan. N. lat. 2° 50'. E. long. 75°.

PLATA *Keys*, a large sand-bank among the Bahama islands, about 40 miles N. of Hispaniola.

PLATÆ, a word used by some anatomical writers to express the scapulæ.

PLATÆA, in *Ancient Geography*, an island of the Mediterranean, on the coast of Lybia, whither, according to Herodotus, the Cyrenians sent a colony. It was situated on the coast of the Giligames, in the midway between that coast and the isle of Aphrodisias. Scylax places it on the coast of Marmarica.

PLATÆÆ, a town of Greece, in Bœotia. Homer writes this name in the singular Πλαταια, Platæa; but the historians write it Πλαταιασι. It was situated on the river

Afopus; and seems to have derived its name from Platea, the daughter of an ancient king of the country, who had given his own name to the river Afopus.

The first military exploit of the Platæans, of which we have any knowledge, occurred at Marathon, where they effectually aided the Athenians; they afterwards distinguished themselves on many occasions; but after having experienced the calamities of many wars, and having been frequently driven from their city and recovered it, their ruin was accelerated by Philip, after his victory in the battle of Cheronæa. Near the walls of this city was the tomb of those Platæans who had fallen in combating against the Persians. The other Greeks had also a common sepulchre, whilst the Athenians and Lacedæmonians had another apart for themselves. Jupiter *Liberator* had an altar near the common burying place of the Greeks; both the robes and the statue of the god were of white marble. The Platæans instituted games, which they celebrated every fifth year, on which occasion they ran armed before the altar of Jupiter. The temple of Juno was very splendid and highly ornamented; her statue was of an extraordinary size, and executed by Praxiteles of Pentelician marble. Minerva had also a temple at Plataea, which had been erected of the spoils gained from the Persians in the battle of Marathon. Her statue was the work of Phidias, and was not less in size, than that of bronze in the citadel at Athens. In this city was also the tomb of Leitus, who was the only Bœotian chief who returned from the siege of Troy.

PLATALEA, the *Spoon-bill*, in *Ornithology*, a genus of birds of the order Grallæ. The generic character is this: the bill is long and thin; the tip dilated, orbicular, flat; the nostrils are small, and at the base of the bill; tongue short, pointed; the feet are four-toed and semi-palmate. There are three

#### Species.

\* **LEUCORODIA**; White Spoon-bill. Body white; chin black; hind-head sub-crested. The bill is black, brown, or spotted; tongue heart-shaped; irids grey; lores, orbits, and naked dilatable chin black; quill-feathers sometimes tipped with black; the legs are black. There are two varieties of this species, of which the *first* has the wings varied with black and white, the legs yellowish; in the *second* the body is all white; legs flesh-colour. The white or common spoon-bill weighs about three pounds and a half, and measures two feet eight inches in length. It inhabits from the Feroe islands to the Cape of Good Hope; it is rarely seen in England, but its appearance is sufficiently frequent to justify us in placing before it the asterisk. It lives on grass, carices, the roots of reeds, serpents, frogs, muscles, and other shell fish; but especially on fishes, which it often seizes from other birds. It makes its nests in high trees, near to the sea, and lays three or four white eggs, speckled with pale red spots. The flesh of the young spoon-bill is reckoned very good, little inferior to that of the goose.

**AJAJA**; Roseate Spoon-bill. Body rose coloured; tail-coverts scarlet. There is a variety blood-red; neck white; collar black; tail-feathers scarlet. It inhabits South America, and is twenty-seven inches long.

**PYGMÆA**; Dwarf Spoon-bill. Body above brown, beneath white. It is only the size of a full-grown sparrow, and is found in Guiana and Surinam.

PLATAMON, a word used to express a low and smooth rock, just appearing above water.

PLATAMONÉ, in *Geography*, a town of European Turkey, in Macedonia, at the mouth of the river Jenicoro; 44 miles S.S.E. of Edessa.

PLATANAL, a small island in the Spanish main, near the coast of Darien. N. lat. 9° 6'. W. long. 80° 40'.

PLATANARIA, in *Botany*, a name by which some authors have called the *sparagarium*, or burr-reed, from its round echinate fruit, which in shape and size much resemble those of the platanus.

PLATANI, in *Geography*, a river of Sicily, which rises near Castro Nuovo, and runs into the sea, 10 miles S. of Sacca.

PLATANUS, in *Ancient Geography*, a town of Asia, in Syria; situated on the western bank of the river Orontes, E. of mount Casius, towards N. lat. 35° 50'.—Also, a town of Phœnicia, placed by M. d'Anville between Berytus and Sidon, in the vicinity of Libanus.

PLATANUS, in *Botany*, the classical name of the Plane-tree, adopted by the Romans from the Greeks, whose *πλατανος* was derived from *πλατυς*, broad, in allusion to the wide spreading branches, and umbrageous foliage, of this noble and favourite tree.—Linn. Gen. 498. Schreb. 649. Willd. Sp. Pl. v. 4. 473. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 5. 304. Pursh North Amer. v. 2. 635. Juss. 410. Lamarck Illustr. t. 783. Gærtn. t. 90.—Class and order, *Monoclea Polyandria*. Nat. Ord. *Amen-taceæ*, Linn. Juss.

Gen. Ch. Male flowers compound, disposed in a globular catkin. *Cal.* A few slight minute segments. *Cor.* scarcely discernible. *Stam.* Filaments oblong, swelling upwards, coloured; anthers square, surrounding the lower part of the filament.

Female flowers numerous, forming a globe, on the same tree. *Cal.* of several minute scales. *Cor.* Petals several, concave, oblong, club-shaped. *Pist.* Germens several, awl-shaped, ending in awl-shaped styles; stigma simple, recurved. *Peric.* none; several fruits are collected together into a globe. *Seed* roundish, tapering at the base, crowned with the awl-shaped permanent style, the bottom of the seed being surrounded with copious capillary down.

Obf. Linnaeus submits his description of the flowers to the more attentive scrutiny of "some lynx-eyed observer," but no one as yet has taken up the challenge. Mr. Bauer's fine drawing of *P. orientalis*, for the Flora Græca, has no male flowers.

Eff. Ch. Male, Catkin globose. Calyx and corolla obsolete. Anthers surrounding the filament.

Female, Catkin globose. Calyx of many leaves. Corolla none. Stigma recurved. Seed club-shaped, pointed by the style, bristly at the base.

1. *P. orientalis*. Oriental Plane Tree. Linn. Sp. Pl. 1417. Willd. n. 1. Ait. n. 1. (Platanus; Ger. Em. 1489. Matth. Valgr. v. 1. 120. *P. orientalis verus*; Duham. Arb. v. 2. 172. t. 33.)—Leaves palmate, five-lobed; wedge-shaped at the base; segments lanceolate, sinuated; ribs pedate. Stipulas nearly entire.—Native of the Levant.—A specimen in the Linnaean herbarium was gathered by Hasselquist, from a remarkably large tree, in the island of Cos, now Stanchio, the circumference of whose trunk was thirteen and a half Swedish ells, about eight yards and a half. This beautiful species is among the earliest exotic trees recorded to have been cultivated in Britain, being mentioned by Turner in 1548; but the great lord Bacon appears to have been the first who planted it in any abundance. The Greeks and Romans esteemed this tree very highly for its shade, as well as beauty. About the Roman villas it was always planted, and sometimes honoured, rather than benefited perhaps, with libations of wine. Some ancient trees of this kind are reported to have attained a more ample size than the above.

## PLATANUS.

above. The finest Oriental Plane, we believe, in England, stands at one corner of Chelsea garden, raising its round head far above all neighbouring objects. Miller speaks of this as the Maple-leaved variety, now made a species, see n. 3; and he asserts, that young plants, which sprung from its seeds, proved of the common sort. We have no opportunity at present of investigating this point. An elegant specimen of the Oriental Plane, whose spreading branches are feathered down to the ground, stands near the temple in the arboretum at Kew. In Germany, this species is not hardy enough to attain the size of a tree. The *branches* of *P. orientalis* are round, smooth, slightly zigzag. *Leaves* deciduous, alternate, on longish, round, downy stalks, rather deeply palmate, about a span wide, with five lanceolate, more or less deeply or copiously sinuated, lobes, whose points are callous or glandular, and somewhat incurved: both sides are smooth, with pedate ribs, and innumerable fine veins: in an early state only, the leaves are clothed with mealy deciduous down. *Stipulas* tubular, surrounding the branch, with a spreading border, more entire in this species than the rest. *Buds*, as in the whole genus, enclosed in the hollow base of each *footstalk*, ovate, obtuse, compressed, quite concealed till the leaves fall. By their swelling, the buds promote the separation of the *footstalks*. *Flowers* in three or four globular heads on each long drooping stalk, appearing in April and May. *Stigmas* crimson. Each globe of ripe *fruit* is an inch or more in diameter.

2. *P. cuneata*. Wave-leaved Plane Tree. Willd. n. 2. Ait. n. 2. (*P. orientalis undulata*; Ait. Hort. Kew. ed. 1. v. 3. 364.)—Leaves three or five-lobed, toothed; wedge-shaped and elongated at the base; triple-ribbed, nearly smooth.—Gathered by Hasselquist in the Levant. Miller is said to have cultivated it in 1739. In some points this answers to his “Spanish, or Middle Plane Tree;” but we find great difficulty in applying with certainty the English names of this genus, which are in use amongst nursery-men. The *leaves* in our wild specimen are remarkably wedge-shaped, and elongated at their base; in consequence of which there are only three principal ribs, of which the lateral ones are seldom precisely opposite: the lobes are three, strongly sinuated, but not separated so far as the middle of the leaf. *Footstalks* long. Miller describes them short, and covered with short down, in his Spanish Plane, which character answers to another specimen in the Linnean herbarium from Burgundy, resembling the true *orientalis*, except in its short *footstalks*, and strongly toothed *stipulas*. This specimen may be a nondescript species. The leaf in Duham. Arb. v. 2. t. 34. given for the following, represents our plant very well.

3. *P. acerifolia*. Maple-leaved Plane Tree. Willd. n. 3. Ait. n. 3. (*P. orientalis aceris folio*; Tourn. Cor. 41.)—Leaves heart-shaped, five-lobed, smooth, distantly toothed; abrupt and three-ribbed at the base.—Native of the Levant, where it was noticed by Tournefort. The Hort. Kew. mentions this species as cultivated here before 1724. Willdenow says it is hardy, forming a lofty tree, in Germany, and that it is known from all the rest by the *leaves* being abrupt, not wedge-shaped at the base, and having their two lateral ribs spring from the top of the *footstalk*, unaccompanied by any leafy expansion beyond them. He adds, that they are extremely like those of the Sugar Maple, *Acer saccharinum*. We have no specimen that answers to this description, nor does Duhamel’s t. 34. given as Tournefort’s plant, agree with Willdenow’s account.

4. *P. occidentalis*. American Plane Tree. Linn. Sp. Pl. 1418. Willd. n. 4. Ait. n. 4. Cateb. Carolin.

v. 1. 56. t. 56. Duham. Arb. v. 2. 172. t. 35.—Leaves with five angles, slightly lobed, toothed; wedge-shaped at the base; downy beneath.—Native of the banks of rivers in North America, from Canada to Florida, as well as in Louisiana. Mr. Pursh says this is perhaps the largest North American tree, some individuals, on the fertile banks of the Ohio and Mississippi, measuring from ten to sixteen feet in diameter. It is known by the names of Buttonwood, Water Beech, Sycamore, and Plane Tree; in Canada by that of Cotton Tree. This Plane has been cultivated in England about 180 years, and is usually hardy with us, as well as in Germany, flowering like the other species in April and May; but the winter of 1810, or spring of 1811, was fatal or injurious to most of the Occidental Planes in England, owing perhaps to transient cold, not generally observed, at some critical period of the growth of these trees in particular. The broad, slightly lobed foliage distinguishes this species readily from all the rest. The three or five principal ribs have a considerable leafy, though scarcely wedge-shaped, expansion below the point of their union. The *stipulas* are wavy, with blunt shallow teeth. *Footstalks* rather short, downy.

PLATANUS, in Gardening, contains plants of the exotic deciduous tree kind, of which the species cultivated are; the oriental plane tree (*P. orientalis*); and the American plane tree (*P. occidentalis*).

Of the first sort there are two varieties, as the *maple-leaved*, which has not its leaves so deeply cut as those of the eastern plane: they are divided into five segments, pretty deep, but are not lobed, like those of the occidental plane. The petioles are much longer than in either of the species, and the upper surface of the leaves is rougher, so that they might be taken for different sorts, if it was not known that they rose from the same seeds.

The *Spanish* plane, which has larger leaves than either of the sorts, and are more divided than those of the occidental, but not so much as those of the oriental. Some of the leaves are cut into five, and others into three lobes only; these are sharply indented on the edges, and are of a light green; the *footstalks* are short, and covered with a short down. This is by some called the middle plane tree, from the leaves being of a shape between the two species.

*Method of Culture*.—These plants may be increased by seed, layers, and cuttings; but principally in the two last methods.

The best season for sowing the seed is autumn, if they can be procured, otherwise in the spring, upon a somewhat lightish mellow soil: the ground having been dug and raked, it should be formed into four-feet wide beds, and the seeds then scattered evenly on the surface, and raked in, or with the back of a rake the earth be previously trimmed off the surface near half an inch deep into the alleys; then sowing the seed, and directly with the rake turned the proper way, drawing the earth evenly over the seeds, and trimming the surface smooth, when many of the plants will rise in spring, but probably not generally till the spring following. When they are one or two years old, they should be planted out in nursery-rows, two feet asunder, and about half that distance in the lines; to remain till of a proper size for being finally set out.

In the layer method, some stout plants must be planted for stools, which in a year after must be headed down near the bottom, that they may throw out many shoots near the ground convenient for laying; which, in the autumn after they are produced, should be laid down by slit-laying; and by the autumn after they will be well rooted, and form

plants

plants two or three feet high, which may be separated, and planted in nursery rows, as the seedlings. They succeed very readily in this way.

Most of the sorts take tolerably by cuttings of the strong young shoots; but the latter more freely than the former kinds. The most proper season for planting them is the autumn, as soon as the leaf falls, or occasionally in the spring; choosing a moist soil for the purpose, when many of the cuttings will grow, and make tolerable plants by the autumn following.

These last two methods are the only ones in order to continue the distinct varieties effectually.

These trees have a very ornamental effect in all sorts of plantations, from their large growth and the great size of their leaves.

**PLAT-BAND**, a border or bed of flowers, along a wall, or the side of a parterre; frequently edged with box, &c.

**PLAT-BAND**, in *Architecture*, is any flat square moulding, whose height much exceeds its projecture.

Such are the faces, or fasciæ, of an architrave, and the plat-bands of the modillions of a cornich.

The plat-band is signified in Vitruvius, and others, by the words *fascia*, *tania*, and *coria*.

**PLAT-BAND** of a door or window, is used for the lintel, where that is made square, or not much arched.

These plat-bands are usually crossed with bars of iron when they have a great bearing; but it is much better to ease them by arches of discharge built over them.

**PLAT-BANDS** of flutings, the lists, or fillets, between the flutings of columns.

**PLATE**, in *Commerce*, denotes gold or silver wrought into vessels for domestic uses.

**PLATE**, in *Geography*, a town of Hinder Pomerania, on the Reg2; 22 miles S. of Colberg. N. lat. 53° 49'. E. long. 15° 17'.

**PLATE**, in *Heraldry*, is a round flat piece of silver, without any impression; but, as it were, formed ready to receive it.

The term is used only by the English heralds. In other nations they are known by the name of *besants argent*.

**PLATE-Mail**, in *Ancient Armour*. See **MAIL**.

**PLATE-Armour**, formed of small round plates of iron, like the scales of a fish, was known and used among the ancients. There are many specimens of Roman plate armour in the museums of curious collectors. If the suit of armour, shewn in the Tower of London, be really what it is said to have been, the armour of John de Courey, earl of Ulster, in Ireland, brought with him to the Tower; it will prove that plate-armour was in use as early as 1204, the date of his confinement. The general prevalence of it was checked by the large sum which a complete suit of plate-armour cost. It was, however, introduced both here and in France into more common use about the middle of the 14th century.

**PLATE**, a term used by our *Sportsmen*, to express the reward given to the best horse at our races.

The winning of a plate is not the work of a few days to the owner of the horse, but great care and preparation are to be made for it, if there is any great dependence on the success. A month is the least time that can be allowed to draw the horse's body clear, and to refine his wind to that degree of perfection that is attainable by art.

It is first necessary to take an exact view of his body, whether he be low or high in flesh; and it is also necessary to consider whether he be dull and heavy, or brisk and active when abroad. If he appear dull and heavy, and there is reason to suppose it is owing to too hard riding; or, as the proverb expresses it, to some greafe that has been dissolved

in hunting, and has not been removed by scouring, then the proper remedy is half an ounce of diapente, given in a pint of good sack; this will at once remove the cause, and revive the creature's spirits. After this, for the first week of the month, he is to be fed with oats, bread, and split beans, giving him sometimes the one, and sometimes the other, as he likes best; and always leaving some in the locker, that he may feed at leisure when he is left alone. When the groom returns at the feeding time, whatever is left of this must be removed, and fresh given; by this means the creature will soon become high spirited, wanton, and full of play. Every day he must be rode out an airing, and every day it will be proper to give him a little more exercise; but not in such a degree as to make him sweat too much.

The beans and oats in this case are to be put into a bag, and beaten till the hulls are all off, and then winnowed clean; and the bread, instead of being chipped in the common way, is to have the crust clean cut off.

If the horse be in good flesh and spirits when taken up for its month's preparation, the diapente must be omitted; and the chief business will be to give him good food, and so much exercise as will keep him in wind, without over-sweating or tiring his spirits. When he takes larger exercise afterwards, towards the end of the month, it will be proper to have some horses in the place to run against him. This will put him upon his mettle, and the beating them will give him spirits.

This, however, is to be cautiously observed, that he has not a bloody heat given him for ten days or a fortnight before the plate is to be run for; and that the last heat that is given him the day before the race, must be in his clothes: this will make him run with greatly more vigour when stripped for the race, and feeling the cold wind on every part. In the second week, the horse should have the same food and more exercise: and in the last fortnight he must have dried oats, that have been hulled by beating; after this they are to be wetted in a quantity of whites of eggs, beaten up, and then laid out in the sun to dry; and when as dry as before, the horse is to have them. This sort of food is very light of digestion, and very good for the creature's wind. The beans in this time should be given more sparingly, and the bread should be made of three parts wheat, and one part beans. If he should become costive under this course, he must then have some ale and whites of eggs beaten together: this will cool him, and keep his body moist.

In the last week the mash is to be omitted, and barley-water given him in its place; and every day, till the day before the race, he should have his fill of hay; then he must have it given him more sparingly, that he may have time to digest it; and in the morning of the race day, he must have a toast or two of white bread, soaked in sack, and the same just before he is led out of the field. This is an excellent method, because the two extremes of fullness and fasting are at this time to be equally avoided; the one hurting his wind, and the other occasioning a faintness that may make him loose. After he has had his food, the litter is to be shook up, and the stable kept quiet, that he may be disturbed by nothing till he is taken out to run. See **RACING**.

**PLATES**, in *Gunnery*. The *prize-plates*, are two plates of iron on the checks of a gun-carriage, from the cap-square to the centre, through which the prize-bolts go, and on which the hand-spike rests, when it poises up to the breech of the piece. *Breach-plates* are the two plates on the face of the carriage, one on each check. *Train-plates* are the two plates on the checks at the train of the carriage. *Dulidge-plates* are the fixed plates on the wheel of a gun-carriage, where

where the fellows are joined together, and serve to strengthen the dulidges.

PLATES, *Copper*, in *Engraving*. See COPPER-Plates.

PLATES, *Ground*, in *Building*. See GROUND-Plates.

PLATES, *Pintle*. See PINTLE.

PLATE-Glafs. See GLASS.

PLATES, *Colours of Glass*. See COLOURS.

PLATE-Knees, in *Ship Building*, are iron knees, made of flat bars of iron, about one inch thick, and four inches broad; the arms are bolted through the end of the beam, and a choek of oak under the beam, which is first bolted through the ship's side. This method of connecting the beams to the side is an excellent substitute for wood hanging-knees.

PLATE-Longe, in the *Manege*, a woven strap, four fathoms long, three fingers broad, and as thick as one. It is used for raising a horse's legs, and sometimes for taking him down, in order to facilitate several operations of the farrier. Some improperly give the name of plate-longe to the martingale.

PLATEA, in *Ornithology*, the name of a bird of the long-necked kind, approaching to the nature of the stork and heron, and called in English the spoon-bill. See PLATALEA.

PLATED MANUFACTURE, in the *Arts*. From the valuable properties possessed by silver as a metal, it is much to be regretted that it is not sufficiently plentiful, so as to be used for the fabrication of such articles as are liable to corrosion; more especially such utensils as are employed for culinary purposes. This desirable object has given rise to the desideratum of covering some of the cheaper metals with silver, and this art has always been known by the name of plating.

The art of plating with silver appears to have been first applied to articles made of brass, after they were in other respects finished. It is known by the name of French plating, and was formerly much used for brass candlesticks. After the goods were polished, and perfectly free from grease, and indeed any other extraneous matter, the part to be plated was heated to a temperature something short of changing the colour of the metal. Leaf silver was now laid upon the part, and, while hot, was rubbed on with a hardened steel burnisher, perfectly dry and clean. By this means the silver adhered firmly to the brass, which, from the action of the burnisher, assumed a fine polish. These had much the appearance in colour and lustre of those of the present day. They possessed but little permanence, owing to the thinness of the covering. This art is scarcely now practised, from the introduction of the superior plan of plating upon ingots of copper, and forming the utensils out of the sheets and wire made from the ingots. This latter is at present carried on to an immense extent in Sheffield, and also at Birmingham, but on a lesser scale.

The inventor of this method of making plated articles was not aware of its great importance. He began by making it into snuff-boxes, and other trifling articles. It afterwards was extended to the manufactory of pints and tankards, and other articles, by a Mr. Hancock, who erected a mill near Sheffield for rolling the ingots. This mill is at present employed for this purpose by the son of the above gentleman.

The plated manufacture is divided into three departments, in each of which a distinct set of workmen is employed.

Those workmen employed in making vessels, such as are required to be raised by the hammer, are called braziers, probably from braziers being first employed in it.

The next are called candlestick makers, being exclusively employed in making all the varieties of these articles.

The next and last are called pierce-workers: these were originally employed in making articles with ornamental open work, such as bread-baskets, and trays of different kinds.

This open work was formed by piercing the substance with punches of different shapes, by means of a screw-press called a fly.

This species of work is now become obsolete, since the invention of plated wire. The articles in which pierce-work had been made, are now formed by the varied interfections of wires, which give great lightness and elegance, with less waste and more expedition. The workmen employed in this department are still called pierce-workers.

Previously to describing particularly the different branches of this art, we shall give the method of preparing the plated sheets and wire of which all the different articles are made.

The ingots on which the silver is laid are not pure copper, but an alloy, consisting of copper and brass; this gives it a degree of stiffness greater than that of copper, which renders it less liable to be deformed when in use.

Fig. 12. in *Pl. Plated Manufacture*, represents a section of the furnace used for melting the alloy for the purpose of casting. The crucibles are those made at Chelsea with black-lead. The ingot-moulds are of cast-iron, consisting of two pieces, fastened together by two rings, with wedges, the interior being of the shape of a parallelepipedon, about three inches broad,  $1\frac{1}{2}$  in thickness, and about eighteen or twenty long. The mouth-piece, into which the metal is poured, makes an angle with the length of the cavity; so that when the mould is placed on the ground, with the narrow side uppermost, and makes an angle with the horizon of about ten degrees, the mouth-piece points directly upwards. The inclination of the mould and the length of the mouth-piece are to give a certain head of liquid metal, which determines the impurities of less specific gravity than the metal to rise into the cavity of the mouth-piece, in order to insure the soundness of the ingot. If this were not attended to, the sheets rolled from such ingots would abound with seams and loose places. It is easy to see that a small hole in the ingot would be the source of a seam by extension, and a larger cavity would have the effect of making hollow places in the substance of the sheet, which frequently peel off with the silver after plating.

The proper heat of the metals, and the temperature of the mould when the metal is poured, are of great importance, as far as regards the soundness of the ingot. When the metal is too cold, and its liquidity of course imperfect, the impurities cannot freely ascend, which causes imperfection in its substance. The same effect may take place from the moulds being cold: this, with the great conducting power of the metal mould, rapidly robs the metal of its caloric, and lessens its liquidity. The proper heat for the moulds is something short of burning the fat with which they are greased on the interior surface. The presence of fat which contains hydrogen has a happy effect in preventing the surface being rough. Its presence is therefore essential, and hence the moulds should never be so hot as to destroy it. On the other hand, the metal should not be too hot, as in this case it remains longer in the liquid state than is proper: this has the effect of allowing the metal to assume a more complete crystalline arrangement than under ordinary circumstances. When an ingot under such circumstances is broken, the crystals are very distinct. The sheet rolled from an ingot so cast, will be found to exhibit on its surface very thin loose pieces, which peel off. This is frequently a source of great mischief to the manufacturer. After the pieces are plated

and

## PLATED MANUFACTURE.

and rolled, this last inconvenience is frequently so great, as to render the whole sheet useless, except to work over again.

It will be remembered, from what we observed respecting the temperature of the ingot moulds, that the proper heat for the metal can only be acquired by practice. Men of some talent and observation should have the management of casting and plating. It is notorious, however, throughout the trade, that the men employed in this essential department are generally taken from the class of common labourers.

The best test for the proper degree of heat of the metal is its colour, and the appearance of liquidity. When it first fuses it appears stiff, and of the colour of the red cokes of the furnace: with a greater heat it becomes more liquid, and assumes a bluish colour. This latter is the proper state for pouring it into the mould. If the heat be greater, the zinc of the brass, and perhaps the copper itself, begins to burn. This arises from the metal's assuming the form of vapour, which combines with the oxygen of the atmosphere. When the metal has become solid in the mould, the wedges which keep the two halves of the mould together are slackened, to prevent the ingot from breaking, by its contraction, during cooling. When it is taken from the mould its surface ought to be smooth and metallic. Its fracture should exhibit a rough uniform crystallization, in which the crystals present small surfaces. If the crystals appear distinct, with large faces, the metal will be shelly when rolled.

For the ordinary kind of work these ingots are generally cut in two in the middle, being more convenient for plating than longer pieces.

The next process is to dress the face of the ingot for the purpose of receiving the silver, on one or both sides, as it may be intended to be single or double plated. This is effected by filing, which is continued till the surface becomes entirely free from the least blemish. This is so important, that the naked eye should not be depended upon. A very small hole in the ingot would become a surface on rolling, and the silver would come off in that part. The surface of the copper should, therefore, be minutely examined by a magnifier before the silver is laid on. The thickness of the silver to be laid on the copper will be best known, when it is understood, that the silver, in single plated metal, or that plated on one side only, is from 8 to 10 pennyweights to the pound troy of copper; and, of course, double that quantity when plated on both sides. If the ingot of copper be  $1\frac{1}{4}$  thick, the silver plate to be laid upon it, at eight pennyweights to the pound, will be  $\frac{1}{2}$  of an inch, and a square inch of it will weigh about 90 grains. When the plate of silver is cut to a little less than the size of the copper surface, made flat, and scraped perfectly clean, the copper surface being equally clean, they are laid together, and the silver plate is tied down with wire. A little of a saturated solution of borax is now insinuated under the edge of the silver plate on every side: this fuses at a low red heat, and prevents the oxygen of the atmosphere from affecting the surface of the copper, which would prevent the adherence of the silver. In this state the ingot is brought to the plating furnace.

In *fig. 12.* B is an iron door, with a small hole to look through. This furnace has a grate on a level with the bottom of the door. The fuel consists of cokes. The ingot is laid upon the bare cokes, and the door shut. When it has acquired nearly a proper degree of heat, the plater applies to the hole in the door to observe the proper point, when the process is finished. When the silver and copper are uniting, the surface of the former begins to be

riveted, and this is the sign to remove the ingot from the fire as quick as possible. If it were allowed to stop longer, the silver would become alloyed with the copper, and completely spoiled.

In this process, the silver is, in fact, foldered to the copper, although no folder is expressly employed. It is well known to chemists, that an alloy of silver and copper, as well as many other alloys, is more fusible than either of the simple metals. From what takes place in the above process, it will be easily inferred, that a portion of silver and copper unite at contiguous surfaces, which fusing before the silver or the copper, unite the silver with the copper. The ingot, being now plated, is made perfectly clean, and is ready to be rolled. The first rollers employed for plated metal are of cast-iron, similar in size and construction to those employed for sheet iron and sheet copper. (See *ROLLING MILL.*) The metal is rolled cold, and annealed from time to time. When it has gone through the rollers a certain number of times, it acquires a certain degree of hardness, so that the rollers have not much effect upon it; and if the rolling were continued, the metal would crack. To remedy this evil, the metal is taken to a reverberatory furnace. It is laid upon a hearth of brick or fire-stone, and the flame of coal made to pass over it. The heat, however, is not intense, since the metal is required to be slowly heated to a dull red. It may now be cooled in the quickest way possible to save time, as quenching in water does not affect it, as is the case with steel. It now passes through the rollers, as before, till it becomes hard, and then annealed and rolled again, till it is reduced something short of the size required. This being done, it is again annealed and passed through a pair of rollers faced with cast steel, and finely polished. This gives the surface great smoothness and truth. It is now annealed for the last time: after this, the sheets are immersed in hot dilute sulphuric acid, then scoured with fine Calais sand, which fits them for the workmen to shape into different articles.

Having described the method of preparing the sheet plated metal, we shall next give an account of the method employed for manufacturing plated wire. This is generally a distinct business, being unconnected with the business of making the plated goods.

The pieces of metal to be plated for the purpose of making wire, are forged out of bar copper unalloyed. These pieces are of a cylindrical shape, and about 18 or 20 inches long, and about  $1\frac{1}{2}$  inch in diameter. The true cylindrical shape is given to the copper by wire-drawing: it is then made perfectly clean and metallic by scraping. The silver to be laid upon it is much thinner in proportion to the copper than was stated in the sheet metal. The silver is first formed into a tube, one edge projecting a little over the other. A copper cylinder, a little less in diameter than the tube, and so much longer as to admit one end of it being fastened into a hole, is now heated red-hot, and fastened by one end in the hole. The tube is now slipped upon it, with the seam upwards. A flat steel burnisher, with rounded polished edges, and a handle at each end, is now rubbed briskly backward and forward upon the overlapped edges of silver, at the same time using considerable pressure. By this means the two surfaces are completely welded together, so that it would be difficult to find where the union had taken place.

The cylinder of copper intended to be plated, is now made perfectly clean, the inside of the silver tube being the same. It is now put upon the cylinder, which is about

two inches longer than the tube; a small groove is made round the cylinder coinciding with the ends of the silver tube. Into this groove the ends of the tube are closely worked, so as to render the space between the tube and the cylinder perfectly air-tight. The necessity of this will be obvious, since the whole is required to be heated red-hot, which would cause the oxydation of the copper, and prevent the silver from adhering to it. When the cylinder and tube are together heated slightly red-hot, the same burnisher that was used to unite the tube is now rubbed briskly over the tube in a longitudinal direction. This unites the silver firmly to the copper, and makes it fit for drawing into wire of various forms and sizes. The machinery employed for drawing this wire is precisely similar to that employed for brass and copper wire. The great variety of figure and form given to it depends upon the plate through which it is drawn. Some are flat, others half round, some fluted, or with mouldings. It is chiefly used for making bread-baskets, toast-racks, snuffers, and many other articles, affording much neatness and elegance, with little manual labour. The wire after drawing, like sheets after rolling, is annealed, and afterwards cleaned with hot dilute sulphuric acid.

We shall first describe the manufacture of sheet metal into various articles. It may be easily conceived, that the nature of this metal is so similar to copper, that the working of it with the hammer into various forms will be very similar to that used by copper-smiths, with the difference of more exact and complete tools, and greater care on account of the value of the metal. Formerly all the different shaped vessels were made with the hammer, which made the price of labour very great. Now, all vessels of simple form, and not of large size, are formed in dies by means of the stamping hammer. This operation is now so general, that some manufacturers employ as many as six or eight of these engines.

*Figs. 1 and 2* are two views of the stamp. *A* is a large stone, the larger the better; *b*, the anvil on which the die, *c*, is secured by four screws. See ground plan.

In *fig. 1*, *a, a*, are two upright square pillars, with the angles opposed to each other, which work in angular recesses in the hammer *d*. This admits the hammer to slide freely and truly from top to bottom, by pulling at the rope *f*, which passes over the pulley *e*. This hammer is let fall from different heights, according to the effect to be produced.

All vessels may be raised by the stamp, with the exception of such as are immoderately large, or those of inordinate depth, compared with the diameter. Vessels which are of less diameter at the top and bottom than in the middle, must either be stamped on two pieces, or raised with the hammer by hand.

The dies are, or ought to be, made of cast steel, but it should be as hard as to weld to iron, so that the iron should not be much below the surface of the die. This precaution is necessary only when the die requires to be hardened. In other respects the whole may be cast steel. Those unhardened should be of harder cast steel. No other steel can answer, as it would be liable to abound with flaws, and would not be uniformly hard.

When the die is placed upon the anvil, and the metal cut into pieces of proper size, the next thing is to surround the top of the die with a paste made with oil and clay, an inch or two above the surface. This cavity is now filled with melted lead. The under side of the stamping hammer has a flat face of iron fitted into it, about the breadth and length of the die; this is called the *lickerup*. When the

lead becomes solid, the hammer is raised to a certain height and let fall upon it. The under side of the *lickerup*, from being cut on the surface into teeth in shape like those of a rasp, firmly adheres to the lead, which afterwards rises with the hammer. The metal is now placed over the die, and the hammer with its lead made to fall upon it, till the impression on the metal is complete. If the vessel to be stamped be of any considerable depth, two or three dies are often used, one bigger than another, the last being of the proper size and shape. It sometimes happens, that when the vessel has a long conical neck, they are obliged to have recourse to an auxiliary operation called drafting. These in the plate are called embossing punches.

In *fig. 11*, the punches are made of cast steel, and the cavities turned out in a lathe. The pieces *a, b*, are of lead. This operation is performed by a series of these punches of different sizes, beginning with the largest first, and gradually going on to the smallest. By this means a hollow cone may be raised out of a flat plate, three or four inches in length, and not more than an inch in diameter at the widest part. These punches are also employed for small articles of too great delicacy for the stamp.

It frequently happens, that one part of an article is made by the stamp, and the rest by the hammer. Sometimes they are rudely formed by the hammer and finished by the die.

Cylindrical and conical vessels are mostly formed by bending and foldering. The bending is performed on blocks of wood with wooden hammers, to avoid injuring the plated surface. We shall here recommend a method of turning rings, or any thing in a cylindrical or conical shape. It is already used to great advantage by tin-plate workers. This is done by a machine consisting of three rollers, a section of which is shewn in *figs. 5 and 6*. *A, B, C*, are the three rollers, and *abcd* the piece of metal passed through them to receive the cylindrical or conical shape.

The upper roller, *A*, can be raised or lowered at pleasure, which has the effect of determining the diameter of the cylinder. When one end of the upper roller is higher than the other, it gives the conical shape. In order to solder the cylinder or cone, the two edges are made very true, and are kept in contact by binding with small iron wire. The part where the folder is intended to be run must be made perfectly clean by scraping. The folder employed is that called silver folder. It is an alloy of brass and silver, or rather an alloy of silver, zinc, and copper. The alloy of copper and silver is more fusible than either of these metals, and may be employed as a folder for silver, copper, or plated metal, when the plated metal has no zinc in its composition. It is, however, necessary to employ an alloy of brass and silver as a folder for plated metal. The brass should be the least possible, being no more than what is necessary to give the requisite fusibility to the folder, since too much brass would not only injure the colour, but its malleability is impaired, and the seam would break when it came to be hammered.

The solder is first cast into an ingot, and then rolled thin enough to cut with shears into small fires. Besides the solder they also employ borax, and a substance which floats on the top of melted glass, and is taken off as refuse. It is called *sandiver*, and probably consists of sulphat of potash and flint. The borax is first calcined, which consists in driving off the water of crystallization. The white powder is then mixed with a little water, a small quantity of the powdered *sandiver* being at the same time added. After the seam to be foldered has been smeared with this pulpy mass, and the bits of solder laid on, the whole is exposed to the heat of a lamp with a blowpipe; or if the substance be large, to a charcoal fire, urged with bellows. The borax frit

fuses, and defends the parts to be united from the action of the air. The heat is then increased rapidly till the folder melts. The use of the sandiver is to prevent the iron wire from being foldered to the other metal. It appears that the salt in this substance is decomposed by the iron, by which the surface of the lathe becomes oxydated, and prevented from uniting with the silver or the copper. The sandiver has no action upon the other metals, and therefore does not prevent their union. When the united part is made clean, and hammered with polished tools, the seam cannot be seen on the silvered side. If a yellow line appear, the folder contains too much brass.

Vessels intended to have other forms are generally foldered up in a conical or a cylindrical form, according as the width at the top and bottom of the vessel varies. The metal is so malleable, even in the foldered part, that a skilful workman can give almost any form to a vessel with the hammer.

Mouldings are sometimes formed upon the edges of vessels, which serve to give much strength and stiffness, as well as being ornamental. This operation is performed by an instrument called a swage, see *figs. 3 and 4*. The part *A* lifts up by a joint, and the metal to be swaged is placed between the dies, as shewn in the figures: the part *b* is held in a vice, while the other rests upon it. By striking on the part *A*, at the same time shifting the metal forward, the bead is formed. In *fig. 3*, the part *a* is a guide to regulate the distance of the bead from the edge. The same effect is produced in a neater and more expeditious manner by the rollers, *figs. 8, 9*. *Fig. 10*. is a section, shewing the form of the bead. The two wheels *a, a*, (*fig. 8*.) are placed upon an axis, which have pinions for the purpose, the lower one giving motion to the upper one. The groove in the upper wheel corresponds with the bead in the lower one, and the metal passed between assumes the same figure. This machine, a little varied, may be used as shears to cut the metal into pieces of uniform breadth. A part of the upper wheel *a*, for this purpose must be a little larger, and the edges square and sharp. The lower wheel being put on first, the other must be put on to the other axis, till the face of the enlarged part comes up to that of the other wheel, and in this situation secured by nuts. It will be evident, that if a piece of metal be now placed between them, that the metal will be cut by the projecting part of the upper wheel, in a similar manner to that employed for fitting iron.

The heading and moulding, however, is not at present much used. When prominent parts like these are merely plated metal, they, from being more exposed, soon become bare, and the copper surface is presented.

The greatest improvement ever made in this branch of manufacture, is the introduction of silver edges, beads, and mouldings. Without this means of defending the prominent parts which become so soon bare in the old method, the trade must long since have gone into disgrace, and ultimately to decay. The silver intended to form the prominent and ornamental parts is rolled extremely thin, a superficial inch sometimes not weighing more than 10 or 12 grains.

This is too delicate to have the ornamental form given to it by the swage above described. The two opposite dies being steel, if not very accurately made, would tear silver so delicate as that used for ornaments. It is necessary, therefore, that the sunk part of the die should be steel, and the opposite side lead, as was observed in the stamping, and this is the method generally employed to form these silver ornaments. It seems wonderful, that manufacturers have not thought of doing this by small rollers. It would only require to have the part in which the die is sunk

a wire ring of cast steel, the concave part being a little conical, and made to exactly correspond with a convex cone on one of a pair of rollers, so that by a little force it may be as firm as a solid roller. A ring of lead, or even a straight piece, might act opposite to the die. A much greater variety of dies might be made in this way, than by making dies flat. The dies would cost less, and be better executed. The silver would also run less risk of tearing, than by the stamp or the swage.

When these silver mouldings are formed, and the refuse metal poured off, they are laid upon a level plate, with the hollow side upwards. Small bits of resin are put into the hollow parts, and soft folder melted in with a foldering iron, the point of the same being applied into the groove to keep it in a state of fusion. This is continued till the cavity is quite full. To prevent the folder from accidentally adhering to the convex part, it is previously covered with a paint-like compound of size and whitening. The same expedient is resorted to in all cases where soft folder is employed, or when it is applied to great heat. The soft folder is formed of equal parts of lead and tin. The former metal has so great an affinity for lead, as to require the greatest care to keep these metals separate when one of them is in a state of fusion.

The silver shells, thus filled with soft folder, will now admit of being bent into almost any form. After they are fitted accurately to the place they are to occupy, the part being first made clean and partially tinned, they only require to be secured by temporary fastenings, till the parts can be exposed to a degree of heat capable of melting the folder. This unites the ornament, without leaving any appearance of folder on the outside.

In forming substances which have a massive appearance, such as the feet of tea urns, the handles of vessels, and plated table spoons, no other metal is employed but the sheet. The mass is formed of two shells, which, when put together, form an apparent solid. Each of the concave parts is first filled with soft folder, they are then fitted accurately together, and heat applied till the mass fuses, so that the apparently massive article consists of a shell of plated metal filled with soft folder. Bulky ornaments, in the form of shells and flowers, are frequently put on in this way; some in silver. These have a similar massive appearance to, and strongly imitate, real plate.

All goods formed by hand with the hammer, require great labour in finishing. After hammering the vessel into the proper shape, the marks of the hammer appear like so many flat places. These are removed from the outside of the vessel to the inside, when the inside is concealed, as in tea urns. This is effected by covering either the anvil or the hammer with a piece of the stuff called everlasting. The roughness is transferred to that surface in contact with the everlasting. In hammering plated metal from time to time, it requires to be annealed by heating it red-hot: this discolours both the silver and the copper. These are cleaned by boiling in dilute sulphuric acid, and scowering with Calais sand. The sulphuric acid to the water is in very small proportion. If the silver begins to appear black by boiling, the acid is too much, and must be watered. When the vessels are finished in every respect by the maker, and the surface free from oxyd, it frequently happens that bits of rosin, used with soft folder, adhere to it. This is removed by boiling in a weak solution of pearl ashes. The same is also used for cleaning the surface of tinned copper.

The vessels are now ready for burnishing, a process which we shall soon describe.

Our instructions hitherto have particularly applied to braziers' work; we shall next describe the candlestick-making.

In this branch of the business there is great variety. In the commencement of this trade the object was chiefly to imitate those made of silver, and it began with the prevailing taste of imitating the different orders of architecture. The numerous points and prominences thus introduced, were ill fitted for plated metal, as in a very little time their silver disappeared, which gave them the most shabby appearance possible. This obliged the manufacturers to make them more plain and simple, and it was not till the discovery of the silver edges, that candlesticks of plated metal began to gain respect in the world of luxury and fashion. The stems of candlesticks have been made square; some with sharp, others with rounded corners; others oval, but the greatest number with round stems, which appear to be the most consistent and the most permanent. Of these, the patent telescope candlestick has had the greatest run. This consists in the cylindrical part lengthening and shortening at pleasure, by one tube sliding into the other. In this case the tubes are drawn by machinery, similar to that used for drawing the tubes of telescopes. The feet of candlesticks, or the base, are generally made in a die by the stamp. The neck, which is sometimes small in one part, is also stamped. The dish part of the nozzle or socket is made in a die, and the tube part in the same way as the cylindrical pillar. These, for the sake of neatness and expedition, are generally drawn in the wire drawing machine, whether for sliding or not. Some of these tubes are fluted. The prominent moulding and beads are generally of silver. The different parts are foldered together, some parts with hard and others with soft folder. The branches of candlesticks are formed in two halves, like the tea urn feet, &c. In forming such articles as are made of wire, such as bread baskets, toast racks, and casters, the wire is bent into the given form with a wooden block and a mallet. When pieces require to be foldered together, the joinings must be accurately fitted, in order to prevent the copper from appearing. In these cases hard folder is employed. This branch of plated manufacture admits of extensive application. Wires are capable of great variety of positions. The work lately published by sir James Hall, seems to prove that Gothic architecture has originated in the fanciful forms of bended twigs. The perusal of this work could not fail to give important hints to an ingenious manufacturer of plated wire work.

Plated goods, particularly tea urns, and globular vessels for the same purpose, frequently require to be engraved; but it is obvious that, from the extreme thinness of the plate, the graver would lay bare the copper; and if the plate was so thick all over as to admit of engraving, the articles would be very expensive. Both these evils are obviated, by working an extra plate of silver on to the part to be engraved. This is done while the plate, of which the vessel is made, is in its flat form. The part where the engraving will fall is first scraped clean, and a plate of silver, of similar thickness to that employed for silver edges, is cut to the same size, and also scraped clean. The plated sheet is then laid upon a hot anvil, and the plate of silver laid upon the place prepared. It is first rubbed slowly, but with great pressure, with a polished hammer previously heated, but not so as to affect the polish. The plate will begin to adhere, and it may then be slightly hammered; ultimately it will adhere all over, and may now be hammered on a polished flake, till the whole surface becomes plane, and the piece of silver cannot be distinguished from the rest. This process is on the same principle as the plating of wire, and is similar to weld-

ing two pieces of iron together. It appears practicable that the surfaces of any malleable metals, when clean and heated to acquire a certain degree of softness, are capable of uniting. Most people are familiar with the union of two pieces of lead by pressure, even at the common temperature.

When the different plated goods come out of the hands of the workmen, the metal, although clean, is of a dull white colour, possessing no polish whatever.

This last finish is called burnishing, and is generally performed by females in a distinct set of apartments. The burnishing tools are generally made of blood-stone, and some of hardened steel finely polished. The latter are to burnish the minute parts which cannot be touched by the blood-stone, which are employed chiefly for the greater and interrupted parts.

The bits of blood-stone are let into little cases, made of sheet iron, and then finely polished.

The burnishers, if used dry, would adhere to the silver in some places, and would scratch instead of giving the fine polish intended. This is obviated by frequently dipping the burnishing tool into a solution of white soap. After being burnished they are raised, and lastly wiped with clean sheep's leather.

It is a circumstance much to be regretted, that silver, although it is susceptible of so fine a polish, does not keep its lustre. This is occasioned by the sulphur which comes from sulphurated hydrogen, a gas always existing in the atmosphere. The thinnest coating of any substance will prevent this change. If the surface of silver were coated with a solution of gum arabic or isinglass, the defence will not be perceived, and the silver will never change colour.

We shall conclude this article with a few remarks upon the present mode of plating the ingots intended for sheets. It will be evident, that since the heat in plating must be equal to forming a portion of an alloy of silver and copper, which by its early fusion unites the two surfaces together, the silver will not be uniform in its quality, and by wearing will present an alloy having more than its proper quantity of copper; and will, in consequence, exhibit a base colour. It will be remembered, that the method used for plating the wire ingots does not admit of this inconvenience. The silver will keep its colour to the last. We shall no doubt hear, at some period when the plated manufacturers employ men of talent as platers, that the ingots for rolling will be plated by the method employed for the wire.

PLATER, FELIX, in *Biography*, an eminent physician of the 16th century, was born at Basle in 1536, of the college of which place his father was principal. Here Felix received his early education under his father's eye; and afterwards went to complete his medical studies at Montpellier, where he distinguished himself at an early age, and obtained the degree of doctor in 1556. He then returned to Basle, where he is said to have taken another degree in the following year, and settled in the practice of his profession. His reputation and success were soon equal to the promise of his education; for he was appointed to the chair of medicine in 1560, and became the confidential physician of the princes and nobles of the Upper Rhine. In addition to his medical skill, he possessed an extensive knowledge of anatomy, botany, natural history, and other branches of science, and contributed much by his talents and character to the celebrity of his native university, in which he was a teacher upwards of fifty years. He died in July, 1614, in the 78th year of his age, extremely regretted by his countrymen and his brother-professors. He left the following works: "De Corporis humani structura et usu Libri tres," Basle, 1583 and 1603, folio; "De

Febribus Liber," Francfort, 1597; "Praxeos Medicæ Tomi tres," Basle, 1602; "Observationum Medicinalium Libri tres," *ibid.* 1614, &c.; "Consilia Medica," Franef. 1615, in the collection of Brendelius; "De Gangrænâ Epistola," in the first century of the letters of Hildanus. After his death were published "Quæstionum Medicarum paradoxarum et eudoxarum Centuria posthuma," Basle, 1625, edited by his brother, Thomas Plater; and "Quæstiones Physiologicæ de partium in utero conformatione," Leyden, 1650.

Thomas Plater, the brother of Felix, also was a professor of medicine at Basle, and had two sons, Felix and Francis, the former of whom occupied successively the chairs of logic and natural philosophy. Eloy Dict. Hist. de la Medecine.

PLATERNETZA, in *Geography*, a town of Slavonia, on the Save; 10 miles from Pofzega.

PLATES, a cluster of small islands among the Bahamas. N. lat. 22° 30'.

PLATESSA, in *Ichthyology*, a name by which Ausonius and some other authors have called the passer-fish, or common plaife. See PLEURONECTES *Plateffa*.

PLAT-FOND, in *Architecture*, the same as fossit.

PLAT-FORM, in the *Military Art*, an elevation of earth, a floor of wood or stone, on which cannon is placed to fire on the enemy.

Such are the mounts in the middle of the curtains. On the rampart there is always a platform, where the cannon are mounted.

It is made by the heaping up of earth on the rampart, or by an arrangement of madders, rising insensibly for the cannon to roll on, either in a casemate, or an attack in the outworks.

Plat-forms are generally laid sloping towards the parapet, nine or ten inches; this declivity carries off the rain, prevents the gun from recoiling so much when fired as it would do if laid level; and, when loaded, it is more easily brought to the embrasure.

In temporary batteries, the plat-forms are made of planks laid across ground-timbers or sleepers, usually five in number, and kept steady by stakes at each end; there is usually a plat-form made to each gun; it is commonly about eighteen feet long, eight feet broad next the parapet, and about fourteen feet broad at the tail, the intermediate spaces between the plat-forms serving for the shot and other necessities. When a plat-form is to be laid on marshy ground, first lay a floor of two or fascines; cover these with hurdles, twelve or fifteen feet long, and six or seven broad; on these lay a floor of three or four inches of earth, and therein lay the sleepers, and over them the planks. When a battery is built of stone or brick, the plat-form is generally a flat stone pavement ranging the whole length of the battery: this, on account of its resisting the injuries of the weather for a long time, is to be preferred to planks; but in case of bombardment such a plat-form is to be avoided, because the shells will not only break the pavement, but also, by driving about the broken stones, do much mischief to the troops.

All practitioners are agreed, that no shot can be depended on, unless the piece be placed on a solid plat-form; for if the plat-form shakes with the first impulse of the powder, it is impossible but the piece must likewise shake; which will alter its direction, and render its shot uncertain. To prevent this accident, the plat-form is usually made extremely firm to a considerable depth backwards, so that the piece is not only well supported in the beginning of its motion, but likewise through a great part of its recoil. However, it is sufficiently obvious, that when the bullet is separated from the piece, it can be no longer affected by the trembling of the

piece or plat-form; and by a very easy computation it will be found, that in a piece ten feet in length, carrying a bullet of twenty-four pounds, and charged with sixteen pounds of powder, the bullet will be out of the piece before it has recoiled half an inch; whence, if the plat-form be sufficiently solid at the beginning of the recoil, the remaining part of it may be much slighter, since its unsteadiness beyond the first half inch will have no influence on the direction of the shot: and hence a more compendious method of constructing plat-forms may be found out. New Princip. of Gunnery, p. 42.

PLAT-FORM, in *Architecture*, is a row of beams, which support the timber-work of a roof, and lie at the top of the wall where the entablature ought to be raised.

PLAT-FORM is also used for a kind of terrace, or broad, smooth, open walk, at the top of a building, from whence we may take a fair prospect of the adjacent country.

Hence an edifice is said to be covered with a plat-form, when it is flat at top, and has no ridge.

Most of the oriental buildings are thus covered, as were all those of the ancients. Cæsar was the first among the Romans who procured leave to build his house with a ridge or pinnacle.

PLAT-FORM, in a *Man of War*. See ORLOP.

PLATIA, in *Geography*, a small island in the gulf of Engia; 18 miles N.W. of Engia.

PLATIASMOS, of *πλατίζω*, *I dilate*, formed from *πλάσις*, *wide*, a word used by many authors to express a fault in pronunciation, owing to a person's opening his mouth too wide, and thence speaking indistinctly.

PLATICORIA, formed of *πλάσις*, *wide*, and *κόρη*, *pupil*, a word used by medical writers to express a preternatural dilatation of the pupil of the eye, usually owing to a paralytic disorder.

PLATILLA, LA, in *Geography*, a mountain of Spain, N.W. of Molina; celebrated for its mines of copper.

PLATINA, BARTOLOMEO, in *Biography*, an historian who flourished in the 15th century, was born in 1421, at Piadena, in the Cremonese, from which place he chose to take his surname, rather than from that of the family to which he belonged, which was De Sacchi. He was brought up to the military profession, and bore arms some time before he engaged in literary studies, which he probably first pursued at Mantua. He accompanied cardinal Francesco Gonzaga to Rome, where Pius II. aggregated him to his new college of abbreviators. He was deprived of his post by Paul II., who dissolved the college, and turned on the world, without any means of support, seventy learned men, who had been employed in it. Platina, who had more spirit than the others, wrote to the pope, threatening him with an appeal to a council. This menace enraged Paul to such a degree, that he threw Platina into prison, where he was kept four months, till he obtained his liberty by the intercession of cardinal Gonzaga. Three years after this he underwent a more severe treatment, on occasion of a contest between the same pope and the Roman academy of Pomponio Leto, of which Platina was a member. It appears from Platina's own account of this transaction, that he himself was apprehended while at supper with cardinal Gonzaga, brought before the pope, and urged with threats to confess a supposed conspiracy against him; and that he was committed to prison, because he avowed his perfect innocence of the crime laid to his charge. He and several of his friends were put to the torture twice, but when nothing could be found to criminate them, they were gradually liberated. Platina obtained from Sixtus IV. a recompence for his sufferings, in the honourable post of keeper of the Vatican library, which he held till his death in 1481. In the following

following year there was a solemn commemoration of the anniversary of his death. He was considered as one of the ablest scholars of his time. His most celebrated work was the "Lives of the Roman Pontiffs," composed in Latin with great elegance and energy. "It was," says the historian, "one of the first pieces of biographical history which gave an example of good criticism. He frequently examines, doubts, conjectures, cites ancient documents, refutes errors, and sometimes, as might be expected, commits them himself. His greatest fault is the acrimony with which he speaks of some contemporary popes, among whom it may well be supposed that he does not spare Paul II." He was likewise author of the "History of Mantua," from its origin to the year 1464. His other writings are chiefly dialogues on points of moral philosophy, and short treatises on miscellaneous topics: among the latter is one on the culinary science; and what renders this still more curious is, that it is dedicated to cardinal della Rovere. Moreri. Gen. Biog.

PLATINA, or *little silver*, from the Spanish word *plata*, silver; called also *platinum* by some late English chemical writers; in French *le platine*.

Platina, not being liable to oxydation by the agencies of heat, air, or moisture, is usually classed with gold and silver, which possess the same property; and these three metals were formerly, and are still sometimes called the *noble* metals, in opposition to the *base* metals, or those which are oxydable by air and moisture.

It is only about sixty years since platina was introduced into Europe. The first specimens which reached this country were brought from America by Mr. Wood in the year 1749; in the following year some others were presented to the Royal Society by Dr. Brownrig, soon after which Mr. Wood, Dr. Lewis, Bergman, and other chemists, began to examine the properties of this metal. Of late years, Morveau, Jeannetty, Vauquelin, Descoteils, and more especially Wollaston and Tennant, have greatly contributed to our knowledge of this substance. The free importation of platina into Europe was for a long time jealously prevented by the Spanish government, from an apprehension that advantage might be taken of its specific weight, and other general properties, to adulterate gold with it, an objection which the present improved state of chemistry has entirely removed.

*Natural History.*—Platina was for a long time supposed to be the exclusive produce of South America, where it is found in various places, particularly on the banks of the Rio del Pinto, in the district of Choco in Peru; in the mines of Taddo, near the Rio de la Plata in the same district; in the mine of Santa Fé near Carthagena, in New Granada, (Klaproth's Dictionary of Chemistry, iii. 363.); and also, as Dr. Wollaston has lately shewn, in a new mineral from the gold mines in Brazil. (Philos. Transf. 1809, part ii.) Of late years, however, Vauquelin has also discovered platina in Europe, in a grey silver ore from the mines of Guadalcanal, in the province of Estramadura in Spain. Ann. de Chimie, vol. lx.

The natural history of this metal is but imperfectly known. But it is well ascertained that platina is found in its native state in small fragments or grains, loosely mixed with the sand of certain streams, always accompanying gold, and generally interspersed with a variety of other metallic and heavy earthy bodies. The greater part of these impurities is separated from the ore in America; so that when it reaches Europe, it appears in the form of pretty uniform metallic grains, which are neither round nor angular, but are somewhat flattened and smooth; their colour is a greyish-white;

they appear to be partly attracted by the magnet, which is no doubt owing to the iron always mixed with them. Their size varies from that of fine sand to that of a pea. No veins or considerable masses of pure platina have ever been discovered. Some fragments, however, weighing from 10 to 40 grains, have occasionally been found, and are preserved as mineralogical curiosities. An extraordinary large specimen of this kind, exceeding the size of a pigeon's egg, is said to have been given by Humboldt to the National Museum of France; it weighs 1088 grains, and its specific gravity is 15.6. It was found in 1800, in the mines of Taddo, in the district of Choco. Klaproth's Dictionary of Chemistry.

Platina, in the granular form just described, which is properly that of an ore, still containing a variety of impurities, fluctuates in its specific gravity between 15 and 17. In one instance Dr. Wollaston saw it reach 17.7; but this is the heaviest specimen he ever met with. (Phil. Transf. 1805.) This ore scarcely contains 80 per cent. of the pure metal, and sometimes much less; the remainder being a mixture of a great variety of other minerals, such as gold, silver, mercury, iron, copper, lead, chrome, titanium, (Fourcroy and Vauquelin, Annales du Musée, tom. iii.); and, what is very remarkable, no less than four new metals, iridium, osmium, rhodium, and palladium, the existence of which was not even suspected till a few years ago, and which have never been found elsewhere. Various earthy minerals, and especially quartz and hyacinth, are also occasionally found mixed with this ore in different proportions. Wollaston, Phil. Transf. 1805.

*Purification of the Ore.*—Before we describe the properties of platina as a metal *sui generis*, it will be proper to relate the manner in which it is obtained, in a pure and malleable state, from the granular mixture just described.

Various difficulties occur, not only in separating the platina from the other bodies with which it is mixed in the ore, but also, and principally, in bringing the metal to the state of a consolidated malleable mass.

With regard to the separation and purification of platina, this might be effected in an imperfect manner, by selecting and picking out the grains of platina, which are discernible from the other ingredients by their external characters. This, however, would be a most tedious process, and the grains of platina would still be found to contain various impurities, and particularly iron, which would prevent their subsequent consolidation into a malleable mass. Besides, the great infusibility of platina would render such a mode of consolidation, if not impracticable, at least extremely difficult. After trying a variety of methods, more or less imperfect, for the purification of platina, chemists have generally adopted the following process.

The first step consists in separating from the platina ore small globules of quicksilver, which are generally found mixed with it, in consequence of a process of amalgamation, which it undergoes in America, in order to separate the gold from it, when it is first collected. These are easily driven off by a moderate heat. A considerable portion of the other impurities may be easily separated, in consequence of their greater levity: thus, by blowing upon a quantity of these grains, spread over an inclined plane, with a common pair of bellows, the lighter particles, such as those of quartz and iron ore, are readily driven off from those of platina.

The gold, some portions of which always escape the process of amalgamation just mentioned, may be next separated by pouring a small quantity of dilute nitro-muriatic acid upon the grains of crude platina. The quantity of gold thus taken up commonly amounts to about a quarter of a grain

grain from each ounce of the ore; but as much as 7, or in one instance as much as 13, parts of gold are said to have been obtained from 100 parts of the ore. (Proust, *Ann. de Chim.* vol. xxxviii.) In this first operation, a small quantity of platina and other ingredients will also be dissolved; but the gold may be easily precipitated from this solution by sulphate of iron, and the platina by muriate of ammonia.

After the separation of the gold, nitro-muriatic acid, being poured on the remaining mass, will dissolve it, with the exception of a small quantity of black matter (about 3 per cent.), which was formerly mistaken for plumbago, but is now proved to be a compound of osmium and iridium, two of the four new metallic bodies before mentioned, which were discovered a few years ago by Mr. Tennant. See IRIDIUM and OSMIUM; and *Phil. Transf.* for 1804.

These two metals Dr. Wollaston has since shewn to exist also in the crude platina ore, united together in the form of distinct minute crystals, and dispersed through the other grains, from which they can be distinguished and picked out without difficulty. (*Phil. Transf.* for 1805.) Muriate of ammonia being now added to the solution, the platina is precipitated in the form of a yellowish powder, which is a compound of muriatic acid, ammonia, and platina, or an ammoniaco-muriate of platina.

The remaining solution, after the platina has been separated from it, still contains, besides iron, minute quantities of various other substances, amongst which the two other metallic bodies, palladium and rhodium, were discovered by Dr. Wollaston. *Phil. Transf.* for 1804 and 1805. See also PALLADIUM and RHODIUM.

*Consolidation.*—Having now brought the platina to the state of a salt, the next object is to restore the platina, thus purified, to its metallic state, and to consolidate it into a malleable mass. This, from the great infusibility of platina, has long been a matter of considerable difficulty and labour; and although the process has been, of late years, considerably improved and simplified, it still requires from the operator a certain degree of dexterity and experience.

Before we describe the improved process in question, it may be proper to notice the earlier and less successful attempts, which were made for the consolidation of platina.

It had been long discovered that arsenic readily united with platina, and formed with it an alloy of great fusibility. An alloy, therefore, was made of crude platina and arsenic; and the latter metal, being easily volatilized, was driven off by heat; whilst the iron, being oxydated during the process, was also separated from the mass; so that the platina was left in an impure, but malleable state. This mode of consolidation of the crude ore by means of arsenic, first proposed by Aehard and others, was brought to a great degree of improvement by Jeannetty, a working silversmith of Paris (*Ann. de Chim.* vol. xiv.); and utensils of platina were procured by his method at a reasonable price. But the platina so prepared was far from being pure; for it had a lower specific gravity, and still contained small portions of arsenic, iron, lead, copper, besides the four new metals above mentioned; and it did not, therefore, possess in a sufficient degree those qualities which render platina so useful for its various purposes.

The late improvements in the process consist principally in obtaining the platina, not immediately from the crude ore, but from the ammoniaco-muriate above mentioned. By applying heat to this salt, the muriated ammonia is gradually expelled, and the metal passes to the state of a spongy mass, which, by patient and repeated heating and hammering in a strong mould, is at last brought to a malleable

state. Count Mouffin Pouschkin was, we believe, the first person who proposed to prepare platina from the ammoniaco-muriate (*Nichelson's Journal*, vol. ix.); but he used mercury in the process. An amalgam was formed with the spongy mass above described; and by successively heating and hammering this amalgam, the mercury was driven off, and the metal was consolidated into a malleable mass. This method was afterwards farther simplified by other chemists, the intervention of mercury being altogether dispensed with. One of the earliest accounts of this last improvement was published by Mr. Knight. (*Phil. Mag.* vol. vi.) But the most perfect description of this mode of working platina, that has yet been published, is that given by Mr. Cook, in Aikin's Dictionary, vol. ii. p. 233, which, being scarcely susceptible of abridgment, we shall transcribe *verbatim*. "The platina being dissolved in nitro-muriatic acid, the liquor is to be filtered through clean white sand, in order to separate the black powder which floats among it. The clear solution being then decomposed by sal-ammoniac, the yellow precipitate is to be collected, moderately well washed in warm water, and dried. It is then to be distributed into saucers, which are placed in a small oven constructed for the purpose, where they are exposed for a short time to a low red heat, in order to bring the platina to the metallic state, and drive off by sublimation the greater part of the muriated ammonia. When withdrawn, it is a spongy mass of a grey colour. About half an ounce of the platina in this state is to be put into a strong iron mould, about 2½ inches long, by 1½ wide, and is to be compressed as forcibly as possible, by striking with a mallet upon a wooden pestle, cut so as accurately to fit the mould; another half ounce is then added, and treated in the same manner; and so on, till six ounces have been forced into the mould. A loose iron cover, just capable of sliding down the mould, is then laid upon the platina, and, by means of a strong screw press, almost every particle of air is forced out from the platina. This is a part of the process that requires especial care; for if any material quantity of air is left in the mass, the bar into which it is formed is very apt, in the subsequent operations, to scale and be full of flaws. The pressure being duly made, the mould is to be taken to pieces, and the platina will be found in the form of a dense compact parallelepiped. It is now to be placed in a charcoal forge fire, and heated to the most intense white heat, in order completely to drive off the remaining ammoniacal muriate. This being done, it is to be quickly placed on a clear bright anvil, and gently hammered in every direction by a clean hammer. This is to be repeated several times, at the end of which the mass will be perfectly compact, and fit to be laminated or wrought in any other manner that the artist chooses. It is to be observed, that while the platina is heating, it must lie loose in the fire; for if it were held by the tongs, they would infallibly become welded to the platina, and thus greatly damage it. By the time that the platina is thus drawn down to a compact bar, it will be covered by a somewhat reddish semi-vitreous crust, proceeding chiefly from particles of the ashes melted down upon it, and extended over its surface by the hammer. To remove this, the bar, being made red-hot, is to be sprinkled over with pulverized glass of borax, and then kept for a few minutes at a white heat. When moderately cool, it is to be plunged into dilute muriatic acid, by which the borax and other vitreous matter will be dissolved, leaving the platina with a perfectly clean white surface."

It is by methods of this kind that utensils of platina, though still expensive, have gradually become less scarce, and are now much used in chemical manipulations. This

## PLATINA.

metal may now (1814) be purchased in bars at the rate of 15*s.* an ounce; whilst a few years ago, its price was between two and three times as great. The price of platina, in grains, fluctuates between 3*s.* and 4*s.* an ounce.

*Physical and Chemical Properties of Platina.*—The colour of pure platina is between silver-white and steel-grey; its ductility and malleability are very great; it can be brought to the state of laminae of almost any thinness by being pressed between rollers; and it can also be drawn into wire of extreme minuteness. In hardness, platina is scarcely inferior to iron, and it is susceptible of a fine polish; so that coin or medals made of pure platina would admit of very fine impressions, and, like gold, would not be liable to alteration.

The specific gravity of malleable platina is generally found to be about 21.3, never rising to 22 or 23, as some French chemists have erroneously stated; but being subject to slight variations according to the different degrees of density it has received during the process of hammering. Gold, the next heaviest metal, is 19.3; and therefore the density of platina is much more considerable than that of any other known substance. In its native state, however, the specific gravity of the platina ore does not, as was observed before, exceed 17.7; whilst that of the grains of iridium and osmium above mentioned is 19.15, which is a higher degree of specific gravity than that of any other known native substance.

The great ductility of platina has been put in a very striking light by some recent experiments of Dr. Wollaston. (Philos. Transf. for 1813.) This philosopher, whose dexterity in mechanical operations is no less conspicuous, than his views in natural science are acute and refined, succeeded, by a new and ingenious process, in drawing platina wire so small as the  $\frac{1}{100000}$ th, or even  $\frac{1}{1000000}$ th part of an inch in diameter; and the tenacity of the latter was still such as to support  $1\frac{1}{2}$  grain without breaking. The method by which Dr. Wollaston succeeded in obtaining such very fine wire was shortly this: a piece of platina wire, previously drawn, by the usual means, to the  $\frac{1}{1000}$ th of an inch, was fixed longitudinally in the centre of a short cylindrical mould of  $\frac{1}{4}$  of an inch in diameter; the mould being afterwards filled with melted silver, a cylinder of this metal was obtained, having the platina wire in its centre. Now it is evident, that by drawing the silver rod to  $\frac{1}{1000}$ th, the platina wire was reduced to  $\frac{1}{1000000}$ th of an inch; and this was repeated, till, by a succession of similar reductions, the extremely small wires above-mentioned were obtained. The silver coating was then removed by dilute nitrous acid, which left the platina wire untouched. Very fine wires of this kind have been employed by Dr. Wollaston to measure the intensity of very small Voltaic batteries, and have also been applied to some optical purposes.

But the most characteristic property of platina, from which it derives its great value, is that of being neither oxydable by the combined influence of heat, air, and moisture, nor capable of being fused by the most powerful furnaces: on this account crucibles and other utensils are made of this metal, which are singularly useful in chemical experiments. In the state of wire, however, it can be fused and reduced to the state of globules by a very powerful Voltaic battery; and Dr. Marcet has shewn that the same may be effected with great ease by the flame of a spirit lamp impelled by a current of oxygen gas. (Thomson's Annals of Chemistry, vol. ii.) Platina which has been thus melted, appears to be somewhat more ductile and tenacious; and it was from globules melted by the latter method, that the extremely fine wire above-mentioned was obtained. Platina wire, provided it be exceedingly fine, is

also capable, as Tennant and Berzelius have lately observed, of being melted by the common blowpipe; but the globule thus obtained is so minute as to be scarcely ponderable.

Although platina can only be fused in very small quantities, whatever method be employed, it possesses, at a white heat, the valuable property of welding like iron; so that two pieces, when heated to the proper point, may be forged together and united into one uniform mass. This, however, is not very easily effected, on account of the impurities which arise from the fuel and impede the operation.

Platina is not acted upon by any of the acids, except by the nitro-muriatic or oxymuriatic. If two parts by weight of aquafortis of 35° Beaumé, be mixed with six parts of muriatic acid of 15°, and digested with this laminae of platina, nitrous gas is given out, and about one part of the metal is dissolved. (Proust, Ann. de Chim. vol. xxxviii.) This solution is of a reddish-orange colour, and gives an indelible stain to the skin. The muriate of platina is capable of being crystallized by careful evaporation; and by the application of heat alone, it may be reduced first to the state of oxyd, and afterwards to the pure metallic state.

Platina, thus dissolved in nitro-muriatic acid, has the property, (first discovered by Lewis, and already alluded to in describing the purification of platina,) of being precipitated by muriate of ammonia, in the form of a triple salt, or ammoniaco-muriate of platina. This salt, if pure and unmixed with other metals, is of a yellow colour; but it is said to assume a brick-red colour if combined with the oxyd of iron, or the other metals which are mixed with crude platina. The ammoniaco-muriate of platina is but very sparingly soluble in water. It is decomposed by heat alone, leaving behind about 42 per cent. of its weight of platina; so that, in this instance, the metal passes from the state of salt to the reguline state, without appearing in the intermediate form of oxyd.

Both soda and potash, in precipitating platina from its solution, also form triple salts, the general properties of which are analogous to those of the former. There is, however, this remarkable difference between the action of the two fixed alkalies on muriate of platina, that solutions of this salt, however dilute, are instantly precipitated by potash or its compounds; whilst soda does not produce any precipitates from them, the soda-muriate being much more soluble than the two others, both in water and alcohol, and requiring considerable concentration for its crystallization. A solution of platina, therefore, affords an easy test of discrimination between the two fixed alkalies, which are not always easily distinguishable by their other properties.

Solutions of muriate of platina are decomposed by several metallic salts, particularly by solution of muriate of tin, a very minute quantity of which will impart to solutions of platina a bright red colour. Platina, however, is not precipitated by the gallic and prussic acids, or by their compounds. Sulphuretted hydrogen separates platina from its solution in the form of a brown precipitate.

The action of the caustic fixed alkalies on platina, at high temperatures, is considerable. The metal is corroded and partly dissolved, a circumstance which, of course, limits the use of platina crucibles in the analysis of earthy minerals. Nitre, likewise, as Mr. Tennant has shewn, is capable of acting upon, and partly dissolving platina, at high temperatures.

Platina is capable of combining, by fusion, with most of the metals. It forms alloys with gold, with silver, with lead, &c., many of which have been examined by Mr. Hatchett. (Philos. Transf. 1803.) The alloy of platina and gold, in particular, possesses properties, especially

in regard to its hardness and malleability, which may some day be found useful. The alloy of platina and silver is moderately fusible and very malleable; but when heated to redness, its surface becomes uneven, and incapable to be wrought. Lead combines readily with platina at a full red heat, forming a malleable and easily fusible alloy. Mercury acts but slowly upon platina in its malleable state; but the triple salt, or ammoniaco-muriate, readily combines with mercury by trituration, forming solid and brilliant amalgams.

Platina does not appear to be capable of combining with sulphur; but it unites readily with phosphorus, forming a phosphuret of much greater hardness and fusibility than the metal itself. When exposed to a strong fire, the phosphorus is melted and volatilized; a circumstance which has suggested the idea of purifying platina by the intervention of phosphorus. Pelletier, *Ann. de Chim.* xiii. 105.

Platina has not hitherto been extensively used in the arts on account of its high price; but its utility is becoming every day more generally acknowledged. From its great infusibility and unalterability in particular, crucibles, and other utensils made of this metal, are of incalculable value in analytical researches. Many facts are daily brought to light by means of platina instruments, which, without it, might perhaps ever have escaped notice. The remarkable slowness with which platina conducts caloric, increases its utility in many chemical manipulations. Thus small tongs or spoons, or thin slips of laminated platina (which often answer the purpose better than spoons) may be held with the hand by one end, whilst the other extremity is exposed to an intense heat, without the heat reaching the fingers. The touch-holes of guns are now generally made of this metal, instead of gold, which was formerly used for this purpose. From the circumstance of platina not being tarnished by air or moisture, nor scarcely by any chemical agent, mirrors for reflecting telescopes have been made of this metal; and instruments of various kinds might, no doubt, be covered over or plated with it with great advantage.

Guyton Morveau has recommended platina as a substance likely to afford a new and useful means of ascertaining high temperatures, by its dilatations and contractions, which he believes to bear an exact proportion to the changes of temperature. Platina being nearly infusible and unalterable by heat and air, would seem, on these accounts, likely to be a valuable pyrometrical substance. Morveau's contrivance consisted in connecting a bar of platina with a very simple machinery, by which the elongations or contractions of the portion of the apparatus which was exposed to the heat, were rendered conspicuous, and could be accurately measured. *Ann. de Chim.* tom. xlvii.

Platina vessels have, in a few instances, been used upon a large scale in manufactories, especially in the concentration of vitriolic acid, which is usually carried on in large glass retorts, containing as much as 50 or 60 pounds of acid. The bursting of these vessels, an accident both dangerous and expensive, and by no means uncommon, may be totally avoided by substituting vessels of platina. A vessel of this metal, containing 300 pounds of vitriolic acid, has, for many years, been used for this purpose in the manufactory of Mr. Sandman in the Borough. Still larger vessels have since been used for the same purpose by other manufacturers. The distillation is also more easy, because the vessel is set upon a naked fire, instead of being placed in a sand bath.

The metallic glazing, with which some kinds of earthen ware and porcelain utensils have, for a few years past, been

coated, is obtained from oxyd of platina. (*Klaproth's Dictionary*, iii. 380.) This glazing has a brilliant silvery, or rather steel-grey lustre. The ammoniaco-muriate of platina is said to be commonly employed in British potteries for this purpose.

PLATISMA, in *Botany*, from *πλατῆς*, *broad*, the name of the nineteenth section of Lichens, in the *Prodromus* of Acharius. See LICHENES.

PLATNER, JOHN ZACHARIAH, in *Biography*, an able physician, was born at Chemnitz, in Misnia, in August 1694. His father, who was one of the principal merchants of the place, intended to make him his successor in the same line; but resolved to enlarge his mind by a liberal education, and to give him a knowledge of ancient languages and philosophy, before he led him into commercial pursuits. But young Platner possessed a delicate constitution; and, partly on this account, and partly in consideration of the rapid progress which he made in his studies, his parents relinquished their original design, and consented that he should direct his attention to medicine, for which he had manifested a strong inclination. He repaired, therefore, to Leipzig in 1712, where he pursued his studies for the space of three years, when the reputation of the university of Halle induced him to visit its schools. During the following winter, he studied mineralogy and metallurgy in the celebrated mines of Chemnitz; after which he returned to Halle, and received the degree of doctor in September 1716. The pursuit of professional knowledge became his passion, and he spent four years in visiting the most celebrated seats of learning in Europe. At Paris he particularly attended to anatomy and surgical operations, especially to those relative to diseases of the eye, in which he is said by Haller to have acquired such dexterity, as to have succeeded in the cure of some, which the celebrated St. Ives had failed to relieve.

He now determined to settle at Leipzig, and accordingly fixed himself in that city in 1720; and his great professional acquirements were speedily rewarded by public acknowledgements of their value. In 1721 he was appointed professor extraordinary of anatomy and surgery. In 1724 he obtained the chair of physiology, which had become vacant by the death of Rivinus; in 1737 he was promoted to the professorship of pathology; and in 1747 to that of therapeutics. He was also nominated perpetual dean of the faculty, and consulting physician to the court of Saxony. He did not live long, however, to enjoy these flattering distinctions; for he was carried off suddenly, on the 19th of December 1747, in the fifty-fourth year of his age, by a paroxysm of asthma. He had visited his patients on the morning of that day, and given his lecture after dinner; and upon returning home, about six in the evening, was seized with the fatal fit.

He left only three different works, the first of which, entitled "*Institutiones Chirurgiæ Rationalis, tum medicæ, tum manualis*," Leipzig 1745, was published by himself. It passed through several editions. The second, entitled "*Opusculorum Chirurgicorum et Anatomicorum Tomi duo: Dissertationes et Prolusiones*," *ibid.* 1749, was edited by his son, Frederic Platner, a professor of law. And the third, entitled "*Ars medendi singulis morbis accommodata*," *ibid.* 1765, which had been bequeathed by the author to his pupil J. B. Boehmer, upon condition that it should not be published, was printed by a bookseller, Fritsch, into whose hands a copy of it fell eighteen years after the author's death. *Eloy Dict. Hist. de la Med.*

PLATO, a Greek comic poet, who flourished about the close of the fifth century B.C., was contemporary with Aristophanes and Euripides. He is said to have left twenty-

twenty-eight comedies, of which the titles of many are to be found in Athenæus, Pollux, and other writers. Of his works, only a few fragments remain, some of which are of the epigrammatic kind.

PLATO. See PLATONISM.

We shall here observe, that Plato, Aristotle, Aristoxenus, and Plutarch, were for ever complaining of the corruption and degeneracy of music. The pious Plato, indeed, regarded it as fit only for the gods, and their celebration in religious ceremonies, or as a vehicle for religious and moral lectures in the education of youth; and with a methodical spirit censured all such as was used in theatres, social festivity, or domestic amusement: but modern divines might, with equal propriety, declaim against the profane use of bread as an aliment, because it is administered in the most solemn rite of our religion. A line should certainly be drawn between the music of the church and of the theatre; but totally to silence all musical sound, except upon solemn occasions, seems to border upon downright fanaticism.

With respect to perfection and depravity, there is nothing so common among musical disputants, as for the favourers of one sect to call that *degeneracy*, which those of another call *refinement*. But Plato seems to have been always too fond of ideal excellence in every thing, to be satisfied with any other. His complaints of the degeneracy of music, may be seen in his third Book of Laws. The poets, indeed, never fail to charge the corruption of music upon its professors, yet Plato throws the blame upon the poets themselves. "The music of our forefathers," says he, "was divided into certain species and figures. Prayers to the gods were one species of song, to which they gave the name of hymns: opposed to this was another species, which, in particular, might be called threni; another, pæones; and another, the birth of Dionysius, which I hold to be the dithyrambus: there were also citharædic nomi, so called, as being still another song. These, and some others, being prescribed, it was not allowable to use one species of melos for another. But, in process of time, the poets first introduced an unlearned licence, being poetic by nature, but unskilled in the rules of the science, trampling upon its laws, over attentive to please, mixing the threni with the hymns, and the pæones with the dithyrambi, imitating the music of the flute upon the cithara, and confounding all things with all." Plat. de Legibus, as translated by Sir F. H. E. Stiles. Though it was Plato's opinion, that the government of a state, and the morals of a people, would be affected by a change in the national music, yet this was not the opinion of Cicero, who in many other particulars is a rigid Platonist: "Change," says this orator, "the government or customs of a city, and it will certainly change the music." De Legib. lib. iii.

It has been said by many writers, both ancient and modern, that Plato was deeply skilled in the music of his time; but it does not appear that his claims to skill in this art extend further than to mere theory, or a very little more. Plutarch, indeed, in his dialogue, proves his profound musical science; but how? By a long passage from his Timæus, in which he applies musical ratios to the soul.

However this may have been, it is difficult to refrain from numbering this philosopher, together with Aristotle, Aristoxenus, and Plutarch, though such illustrious characters, and, in other particulars, such excellent writers, among the musical grumblers and croakers of antiquity. They all equally lament the loss of good music, without considering that every age had, probably, done the same, whether right or wrong, from the beginning of the world; always throwing musical perfection into times remote from their own, as

a thing never to be known but by tradition. The golden age had not its name from those who lived in it.

Aristotle, indeed, complains of degeneracy in a more liberal way: "every kind of music," says he, "is good for some purpose or other; that of the theatres is necessary for the amusement of the mob; the theatrical transcriptions, and the tawdry and glaring melodies in use there, are suited to the perversion of their minds and manners, and let them enjoy them."

The complaints of Aristoxenus are more natural than those of Plato and Aristotle; for he was not only less a philosopher, but more a musician; and, as a professor, and an author on the subject of music, he must have had rivals to write down. Hesiod says that bards hate bards, and beggars beggars. And it has been the practice for writers on music, in all ages, to treat their contemporaries with severity and scorn. Gaspar Printz inserts in his book a canzonet in four parts, in which every rule of composition is violated, and calls it modern; as if error was always new. But besides a natural tendency in human nature, or at least in the nature of authors, towards envy and malignity, Aristoxenus had a system to support, which is usually done at the expense of moderation, truth, and every thing that stands in its way; for, like the tyrant Procrustes, the builder of a system, or the defender of an hypothesis, cuts shorter what is too long, and stretches to his purpose whatever is too short.

The music of the Greeks, in the time of Aristoxenus, was too remote from perfection to be much injured by innovation and refinement; and yet Athenæus gives a passage from a work of this writer, now lost, in which he makes the following complaints: "I, and a few others, recollecting what music once was, and considering what it now is, as corrupted by the theatre, imitate the people of Possidonium, who annually celebrate a festival after the Greek manner, in order to keep up the memory of what they once were; and before they depart, with tears deplore the barbarous state into which they are brought by the Tuscans and Romans."

Though Aristoxenus lived with Alexander the Great, with Plato, and with Aristotle, when all other arts and sciences had arrived at their greatest degree of force and refinement; yet music, from whatever cause, does not seem, at that, or at any time, to have kept pace with other arts in its improvements: at least, it did not in Italy; nor, indeed, in England or France, if we compare the poetry of Milton with the music of Henry Lawes, or the writings of Racine and Boileau, with the compositions of Lully.

PLATOBERG, in *Geography*, a mountain of France, in the department of Mont Tonnerre; four miles N. of Landau.

PLATONIA, in *Natural History*, a name given by the modern Greeks to the *prox* of Aristotle, and of other ancient writers in that language. This is the *cervus platyceros*, or broad-horned stag. Some have translated this *dama*; but they are to be understood in this as meaning the *dama* of their own times, not that of the ancients; that being the *isarus*, or chamois-goat, not any animal of the stag kind, or by any means meriting that title.

PLATONIC, something that relates to Plato, his school, philosophy, opinions, or the like.

PLATONIC Bodies, are the same with what we otherwise call regular bodies.

PLATONIC Love denotes a pure spiritual affection, subsisting between the different sexes, abstracted from all carnal appetites, and regarding no other object but the mind, and its beauties; or it is even a sincere disinterested friendship subsisting

substituting between persons of the same sex, abstracted from any selfish views, and regarding no other object but the person.

The term took its rise from the philosopher Plato, a strenuous advocate for each kind.

The world has a long time laughed at Plato's notions of love and friendship. In effect, they appear arrant chimeras, contrary to the intentions of nature, and inconsistent with the great law of self-preservation; into which love and friendship are both ultimately resolvable.

PLATONIC Year, or the *great year*, is a period of time determined by the revolution of the equinoxes, or the space in which the stars and constellations return to their former places, in respect of the equinoxes.

The Platonic year, according to Tycho Brahe, is 25816; according to Ricciolus, 25920; and according to Cassini, 24800 years. See PRECESSION of the Equinoxes.

This period, which is more than five times the age of the world, once accomplished, it was an opinion among the ancients, that the world was to begin anew, and the same series of things to return again.

PLATONISM, the doctrine and sentiments of Plato and his followers, with regard to philosophy, &c.

The founder of this system of philosophy, Plato, the son of Aristotus, was an Athenian, related by his father to Codrus, and by his mother to Solon; born in the island of Aegina, where his father resided after it became subject to Athens, on the seventh of Thargelion, in the first year of the 88th olympiad, B.C. 428, or, as it may be more accurately fixed, in the third year of the 87th olympiad, B.C. 430.

He gave early indications of a distinguished genius; and whilst he was young he was instructed in the rudiments of letters by the grammarian Dionysius, and trained in athletic exercises by Aristo of Argos. He applied with industry to the study and practice of painting and poetry. In the latter he made such proficiency as to produce an epic poem, which, however, upon comparing it with Homer, he committed to the flames; and at the age of 20 years he composed a dramatic piece, which he delivered to the performers in order to its being exhibited on the theatre; but in the mean while he became acquainted with Socrates, and so much enamoured of his philosophy, that on the day before it was to have been represented to the public he withdrew it, and gave up all ideas of poetical distinction. After having spent his youth in exercises of the body, painting, poetry, and music, he became, at the age of twenty years, a disciple of Socrates, and applied himself wholly to the study of wisdom. It is supposed, that he received the first tincture of philosophy from Cratylus and Hermogenes, who taught the systems of Heraclitus and Parmenides. But having become a stated disciple of Socrates, he remained with him eight years. Blending, however, foreign tenets with those of his master, and grafting upon the Socratic system opinions which he had taken from some other stock, he occasionally displeased the followers of Socrates, and sometimes gave Socrates himself occasion for complaint. Nevertheless, he retained a zealous attachment to this master, and when he was summoned before the senate, Plato undertook to plead his cause, and began a speech in his defence, which the partiality and violence of his judges would not allow him to prosecute. After the condemnation of Socrates, he presented him with money sufficient for redeeming his life, which, however, this eminent teacher of wisdom refused to accept. During his imprisonment, Plato attended him, and was present at a conversation which he held with his friends concerning the immortality of the soul, the sub-

stance of which he afterwards committed to writing, in the beautiful dialogue entitled "Phædo," intermixing occasionally his own opinions and language. Upon the death of his master he withdrew, with several other friends of Socrates, to Megara, where they were hospitably entertained by Euclid, and remained till the ferment at Athens subsided. Under Euclid he studied the art of reasoning, and probably increased his fondness for disputation. With a view of furnishing himself with all the knowledge which the age in which he lived could supply, he travelled into every country which was likely to answer any useful purpose to him in this respect. In that part of Italy called Magna Græcia, there was a celebrated school established by Pythagoras, and here he was instructed in the mysteries of the Pythagorean system, the subtleties of which he afterwards too freely blended with the simple doctrine of Socrates. He next visited Theodorus of Cyrene, in order to be instructed in mathematical science; and he then determined to study astronomy, and other sciences, in Egypt. Under the disguise of a merchant, and seller of oil, he traversed the whole kingdom of Artaxerxes Mnemon, deriving information from the Egyptian priests concerning their astronomical observations and calculations. In Egypt, it is said, he acquired his opinions concerning the origin of the world, and learned the doctrines of the transmigration and immortality of the soul; but it is more probable, that he learned the latter doctrine from Socrates, and the former from Pythagoras. All things considered, it is not very likely that Plato derived his system of philosophy from the Egyptians; nor is it more probable, that during his residence in Egypt, Plato became acquainted with the doctrine of the Hebrews, and enriched his system with spoils from their sacred books.

The Platonic philosophy appears, in many respects, very consistent with the Mosaic; and a great party of the primitive fathers follow the opinions of that philosopher, as being favourable to Christianity. Justin is of opinion, that Plato could not learn many things which he has said in his works, from mere natural reason; but thinks he might have learnt them from the books of Moses, which he might have read when in Egypt.

Hence Numenius the Pythagorean expressly calls Plato the *Attic Moses*, and upbraids him with plagiarism; because he stole his doctrine about the world and God from the books of Moses.

Theodoret says expressly that he has nothing good and commendable about the Deity and his worship, but what he stole from the Hebrew theology; and Clemens Alexandrinus calls him the *Hebrew philosopher*.

Gale is very particular in his proof of the point, that Plato borrowed his philosophy from the scriptures, either immediately, or by means of tradition; and, beside the authority of the ancient writers, he brings some arguments from the thing itself. As, *e. gr.* Plato's confession, that the Greeks borrowed their knowledge of the one infinite God from an ancient people, better and nearer to God than they; by which people, our author makes no doubt, he meant the Jews, from his account of the state of innocence; as, that man was born of the earth, that he was naked, that he enjoyed a truly happy state, that he conversed with brutes, &c. In effect, from an examen of all the parts of Plato's philosophy, physical, metaphysical, and ethical, this author finds, in every one, evident characters of its sacred original.

St. Augustine commends the Platonic philosophy; and even says, that the Platonists were not far from Christianity. He adds, that the generality of the new Platonists of his time embraced the faith; and he expressly acknowledges, that

that it was by means of the Platonic system he was able to understand the doctrine of the Trinity.

Justin Martyr professes, that Plato's doctrine was of the utmost advantage to him, in helping him to believe the mysteries of the Christian faith. To which it may be added, that it was, in good measure, by Plato's help, that Origen confuted Celsus.

Indeed, the late author of "Platonisme Devoilé" carries things to an extravagant length, when he contends, that the dogmata of our religion are only the opinions of Plato; that the fathers give us nothing of the mysteries thereof, but what they learnt from him; and that Christianity is only Platonism veiled, or covered over. To which opinion, however, M. le Clerc seems also a little inclined.

The opinion, that Plato borrowed the dogmata of his philosophy from the scriptures, which has been strenuously maintained by several Jewish and Christian writers, has, however, as others maintain, little foundation besides mere conjecture; and it is supposed to have originated in that injudicious zeal for the honour of revelation, which led these writers to make the Hebrew scriptures, or traditions, the source of all gentile wisdom.

The chief grounds upon which the above-mentioned opinion rests are the following: 1. The authority of the Jewish writers, Josephus and Aristobulus, and of the Christian fathers, Justin Martyr, Clemens Alexandrinus, Eusebius, Cyril of Alexandria, Theodoret, Ambrose, and others. 2. The opinion that a Greek version of the Hebrew scriptures appeared in Egypt before the time of Plato, which he might have seen and read, as Clemens Alexandrinus and Eusebius, on the testimony of Aristobulus, assert. 3. The presumption, that the Egyptians borrowed many of their tenets from the Israelites, and communicated them to Plato. And, 4. The agreement of the doctrines of Plato with those of the Hebrews. But to these arguments it has been replied, 1. That the testimony of the Christian fathers is, with regard to the present question, of little value; as they had recourse to no authentic memorials or impartial witnesses, but credited the assertions of certain Jewish writers, who, several centuries after the time of Plato, with a view of gratifying their own vanity, and that of their countrymen, pretended that all gentile wisdom had been originally derived from Moses; and particularly, that Plato, during his residence in Egypt, had been instructed in the Hebrew school. This notion was eagerly adopted by several learned Platonists, who in the second century were converted to Christianity, but still retained an attachment to their former master; and from this time it became a common practice among those who affected the credit of Greek erudition, to maintain, that whatever opinions Plato and his followers held, similar to the doctrines of revelation, had been borrowed either from the Hebrews or Christians. 2. A Greek version of the Hebrew scriptures, prior to the time of Alexander, never existed but in the brain of Aristobulus. 3. Equally unsupported is the assertion, that the Egyptians, and even Plato himself, conversed with the Jews on theological subjects. Lastly, no proof of the point in question can arise from the supposed agreement between the Mosaic and Platonic doctrines; for the agreement is either imaginary, or it consists of such particulars as might be easily discovered by the light of reason. Besides, the true doctrine of Plato was so far adulterated and blended with other systems in the Alexandrian school, that those Christian fathers who had studied Platonism in this school, might easily conceive that there was a greater harmony between the Platonic doctrine and their own creed than in reality existed.

Plato, after having availed himself of all the information

which he could receive in distant countries, returned to the Pythagorean school at Tarentum, in Italy, and here he attempted to improve his own system by incorporating with it the doctrine of Pythagoras. In recounting the sources of Plato's philosophy, we may observe, that he borrowed his dialectics from Euclid of Megara; the principles of natural philosophy he learned in the Eleatic school, from Hermogenes and Cratylus; and combining these with the Pythagorean doctrine of natural causes, he framed from both his system of metaphysics. In mathematics and astronomy he was instructed in the Cyrenaic school, and by the Egyptian priests. From Socrates he imbibed the pure principles of moral and political wisdom, the simplicity of which he afterwards obscured by Pythagorean speculations. At length Plato, with his mind thus richly furnished, settled at Athens, and accomplished the design which he had long meditated, of forming a new school for the instruction of youth in the principles of philosophy. The place he chose for this purpose was a public grove, called the *Academy*; which see. Here he established his school, and over the door of it, in order to indicate his respect for mathematical studies, and how necessary a preparation he thought them for higher speculations, he placed this inscription, *Ουδεις ανεισακομιστος εισιτω*: "Let no one, who is unacquainted with geometry, enter here." This school became famous, and was crowded not only by young men from every quarter and of every distinction, but by females disguised in men's clothes. Among the most illustrious of his followers we may reckon Dion, the Syracusan prince, and the orators Hyperides, Lycurgus, Demosthenes, and Isocrates.

Such distinguished reputation excited among the companions of Plato, formerly the disciples of Socrates, a spirit of emulation, which degenerated into envy, and which terminated in detraction and obloquy. To this natural jealousy it was owing, that Xenophon and Plato, though they relate the discourses of their common master, studiously avoid to mention one another. Diogenes the Cynic ridiculed Plato's doctrine of ideas, and other abstract speculations. Nevertheless, the fame of Plato increased, and his political wisdom was held in such high estimation, that several states solicited his assistance in new-modelling their respective forms of government. The Arcadians and the Thebans applied to him for this purpose, but he rejected their applications, because they refused to adopt the plan of his republic, which required an equal distribution of property. He gave his advice to several Grecian states, and furnished a code of laws for Syracuse. At three different periods he visited the court of Dionysius, tyrant of Sicily, and made several attempts to subdue his haughty and tyrannical spirit. The object of his first visit to Sicily, in the fortieth year of his age, was to survey the island, and to observe the wonderful phenomena of mount *Ætna*. During his residence at Syracuse, he was employed in the instruction of Dion, the king's brother-in-law; and in his efforts to rescue his pupil from the baneful influence of the general depravity, he was not disappointed. Dion, inspired with the love of wisdom, was desirous of introducing his preceptor to Dionysius, the tyrant; but his discourse with him being levelled against the vices and cruelties of his reign, the tyrant conceived a prejudice against Plato, and formed a design against his life, which by the assistance of Dion he escaped. Having engaged Pollis, a delegate from Sparta, to take charge of the philosopher, and to land him safely in his own country, Dionysius attempted to defeat his friendly purpose, and engaged Pollis either to put him to death, or to sell him as a slave, in his passage. Accordingly, Pollis sold him in the island of *Ægina*, the inhabitants of which were at war with the Athe-

nians. Here he became acquainted with Anicerris, a Cyrenaic philosopher, who testified his respect for Plato, by purchasing his freedom for thirty minæ, and sending him home to Athens; and when Plato's relations afterwards wished to repay the money which Anicerris had advanced, he declined accepting it, alleging, with the genuine spirit which true philosophy always inspires, that he saw no reason why Plato's relations should engross to themselves the honour of serving him.

After much solicitation and delusive promises on the part of Dionysius, Plato took a second journey to Syracuse, where he was received by the king with singular respect, and sacrifices were offered in congratulation of his arrival. It was not long, however, before Dion was banished into Italy, and Plato was sent back into his own country. Dionysius again renewed his intreaties for the return of Plato to his court, who arrived a third time at Syracuse, and for some time possessed the chief influence and authority there. But finding it impossible to prevail upon Dionysius to adopt his system of policy, or to recall Dion from his exile, a mutual distrust arose between the tyrant and the philosopher, and Plato, dissatisfied with his situation, earnestly requested permission to return to Greece. After some delay permission was granted, and a vessel of convoy was provided; but the tyrant again changed his mind, and detained Plato in Syracuse against his inclination. The tyrant's seeming respect was converted into rage, and the philosopher was dismissed from court, and committed to the custody of soldiers. When his Pythagorean friends at Tarentum heard of his dangerous situation, they dispatched an embassy to Dionysius, demanding a fulfilment of his promises; and the tyrant, dreading the consequences of a refusal, and the disgrace of having banished from his court the first philosopher of the age, gave Plato a magnificent entertainment, and sent him away loaded with rich presents.

Plato, restored to his country and his school, devoted himself to science, and spent the last years of a long life in the instruction of youth. Having enjoyed the advantage of an athletic constitution, and lived all his days temperately, he arrived at the 81st, or, according to some writers, the 79th year of his age, and died, through the mere decay of nature, in the first year of the 108th olympiad, B.C. 348.

He passed his whole life in a state of celibacy, and as he had no natural heirs, he bequeathed all his effects by will to his friend Adiantus. The grove and garden, which had been the scene of his philosophical labours, at last afforded him a sepulchre. Statues and altars were erected to his memory: the day of his death long continued to be celebrated as a festival by his followers; and his portrait is to this day preserved in gems: but the most permanent monuments of his genius are his writings, which have been transmitted, without material injury, to the present times.

The character of Plato has been differently appreciated. Whilst some have extolled him with the language of mere panegyric, as if he had been free even from human frailties, others have loaded his memory with unjust obloquy and reproach. Several anecdotes are preserved which reflect honour on his moral principles and character. Such was his command of temper, that whilst he was lifting up his hand to correct his servant for an offence, and perceiving himself angry, he kept his arm in that elevated posture, and said to a friend, who asked him what he was about to do, "I am punishing a passionate man." At another time, he said to one of his slaves, "I would chastise you if I were not angry." At the Olympic games he passed a day with some strangers, who were delighted with his affable conversation, and who merely knew that his name was Plato. When they parted,

he invited them, if they should visit Athens, to take up their residence at his house: they accepted his invitation, and were courteously entertained. During their stay, they expressed a wish to be introduced to his namesake, the famous philosopher, and to be shewn his academy. Plato, smiling, said, "I am the person you wish to see." The discovery surprized them, nor could they easily persuade themselves, that a philosopher, so eminent, would condescend to converse so familiarly with strangers. When he was informed that his enemies were industriously circulating reports to his disadvantage, he said, "I will live so, that none shall believe them." One of his friends remarking that he seemed no less desirous to learn himself, than to teach others, asked him, how long he intended to be a scholar? "As long," says he, "as I am not ashamed to grow wiser and better."

Of his merit as a philosopher, we may form the most satisfactory judgment from his writings. As to his style, it retained that strong tincture of a poetical spirit, which he discovered in his first productions. Hence have proceeded those encomiums which ancient and modern critics have passed upon his language; and on this account it was held in high estimation by Cicero, who says, that "if Jupiter were to speak in the Greek tongue, he would borrow the style of Plato." Aristotle describes it as "a middle species of diction, between verse and prose." Most of his dialogues, independently of the copious and splendid diction that enriches them, are justly admired for their literary merit: the introductions are pertinent and amusing; the course of the debate, or conversation, is clearly marked; the characters are accurately supported; every speaker has his proper place, language, and manner; the scenery of the conference is painted in lively colours; and the whole is, with admirable art, adorned and enlivened by those minute embellishments which render the colloquial mode of writing so peculiarly pleasing. Even upon abstract subjects, moral, metaphysical or mathematical, the language of Plato is often clear as the running stream, and in simplicity and sweetness vies with the humble violet which perfumes the vale. In these beautiful parts of his works, it has been conjectured, and not improbably, that Socrates and Lyfias were his models. At other times, his style is turgid and bombast, puerile or frigid, and his metaphors are harsh, and he is too fond of introducing new terms, with a bold and unwarrantable innovation. Faults of this kind have been noticed and censured by several ancient critics. His conceptions also have been charged with an inequality, similar to that of his style. Whilst he adheres to the school of Socrates, and discourses upon moral topics, he is much more pleasing, than when he loses himself with Pythagoras, in abstruse speculations.

The Dialogues of Plato are classed by the ancients under the two heads of "didactic" and "inquisitive." The former are divided into "speculative," including *physical and logical*; and "practical," comprehending *ethical and political*. The latter, or "inquisitive," are characterized by terms taken from the athletic art, and divided into the "gymnastic," and the "agonistic:" those termed "gymnastic," supposed to be similar to the *exercise*, were subdivided into the *majestic*, as resembling the teaching of the rudiments of the art, and the *picrastic*, as represented by a skirmish, or trial of proficiency. The "agonistic" dialogues, supposed to resemble the *combat*, were either *eudæistic*, as exhibiting a specimen of skill, or *anætreptic*, presenting the spectacle of a perfect defeat. Instead of this whimsical classification, Plato's dialogues may not improperly be divided into *physical, logical, ethical, and political*.

The writings of Plato were originally collected by Hermodorus, one of his pupils: they consist of 35 dialogues, and 13 epistles. They were first published, after the invention of printing, by Aldus Manutius, at Venice, in 1513. The editions of Ficinus and Serranus are the most valuable; but the notes and interpretations should be read with caution; for Ficinus, having formed his conceptions of the doctrine of Plato after the model of the Alexandrian school, frequently, in his "Arguments," misrepresents the design of the author, and in his version obscures the sense of the original; and Serranus, for want of an accurate acquaintance with the doctrine of his author, and under the influence of a strong predilection for the scholastic system of theology, sometimes gives an incorrect and injudicious explanation of the text.

Availing ourselves of the excellent work, which has furnished the materials of this article, we shall now proceed to detail the philosophical system of Plato, in order to which some general observations should be premised. Plato, disdainful of the sober method of reasoning introduced by Socrates, left his first master in search of other preceptors. Inclined to speculative refinement, and misled by the celebrity of the Italian school, which abounded in subtleties, he attached himself to the Pythagorean philosophy; and pursuing his studies under the Egyptian priests, he deviated still farther from the plain path of common sense, which had been pursued in the Socratic school. Among other errors which he adopted from foreign philosophy, it was not the least that he borrowed the art of concealing his real opinions: and hence his writings became not only incidentally, but perhaps designedly, obscure. After the example of Pythagoras, he threw a veil of obscurity over his public instructions, which was removed only for the benefit of those who were admitted to his more private and confidential lectures. This concealed method of philosophizing he adopted partly from a regard to his personal safety, and partly, if not principally, from motives of vanity. For this purpose the colloquial form of instruction, introduced by Socrates in his contests with the Sophists, and adopted in the Dialectic schools, was found by Plato to be peculiarly convenient. Accordingly Cicero, though an enthusiastic admirer of Plato, observes, that "Plato affirms nothing, but after producing many arguments, and examining a question on every side, leaves it undetermined." His language likewise, occasionally splendid, and at other times ambiguous and equivocal, renders his meaning often doubtful and unintelligible: to which we may add, that the obscurity of his writings is greatly increased by the intermixture of mathematical ideas or language with those of metaphysics. After all, the principal cause of the want of perspicuity that characterizes the writings of Plato is the extreme subtlety of his speculations upon abstract and sublime topics. Raising man above his condition and nature, Plato unites him to certain imaginary divine principles, leads him through various orders of emanation and forms of intelligence to the Supreme Being, and represents these fictions of fancy as the first principles of wisdom. In such a wondrous maze of words does Plato involve his notions, that none of his disciples, not even the sagacious Stagirite, could unfold them; and yet we receive them as sacred mysteries, and if we do not perfectly comprehend them, imagine that our intellects are too feeble to penetrate the conceptions of this divine philosopher, and that our eyes are blinded, as Burnet in his "Archæologia" expresses it, by that resplendent blaze of truth, upon which his eagle sight could gaze without injury. Plato, indeed, ambitious of the honour of forming a new sect, and endued by nature with more bril-

liancy of fancy than strength of judgment, collected the tenets of other philosophers, which were, in many particulars, contradictory, and could by no exertion of ingenuity be brought to coalesce; and that, out of this heterogeneous mass, he formed a confused system, destitute of form or consistency. This, it is said, will be acknowledged by every one, who, in perusing the philosophical writings of Plato, is capable of divesting himself of that blind respect for antiquity, by which the learned so frequently suffer themselves to be misled. In confirmation of this judgment, we need only refer to the dialogue entitled "Timæus;" a chaotic mass of opinions, which no commentators have yet been able to reconcile, or to explain. The followers of Plato, instead of arising to disperse the clouds that envelope his system, seem to have combined in increasing its obscurity. By successive changes in the academy, after the death of its founder, new opinions were introduced, and these increased the difficulty of exploring the true sense of Plato; and when, in a subsequent period, the Platonic philosophy was professed in Alexandria, it was further adulterated by an injudicious and absurd attempt to mould into one system the doctrines of Plato, the traditional tenets of Egypt and the eastern nations, and the sacred records of the Jews and Christians; a coalition which will appear, in the sequel of this article, to have proved exceedingly injurious both to philosophy and religion.

All the preceding circumstances considered, it will appear to be no easy task to delineate an accurate sketch of the Platonic philosophy. This philosophy, as he suggests, and his interpreters allow, may be divided into three branches: the first treating of the art of reasoning, or dialectics; the second, of theoretical questions concerning nature, or physics; and the third, of practical subjects respecting life and manners, or ethics.

Wisdom, in the strict Platonic sense of the term, is the knowledge of those things which truly exist, and are comprehended by the intellect, particularly those which respect God, and the human soul as distinct from the body. Philosophy is the desire of divine science, or the liberation of the mind from the body, and its direction towards those real essences, which are perceptible only by the understanding: accordingly, a philosopher must possess a mind naturally turned towards contemplation, an ardent love of truth, a penetrating judgment, and a retentive memory; and he must also be inured to the exercise of temperance and fortitude, that nothing corporeal may divert him from the pursuit of wisdom. Philosophy, as employed in the contemplation of truth, is termed theoretical; and as conversant in the regulation of actions, it is practical. The former produces a contemplative life, in which the mind, occupied in meditations purely intellectual, acquires a resemblance to the divinity; the latter leads to an active life, and applies the principles of wisdom to the benefit of society. Besides the contemplation of truth and virtue, the philosopher will inquire into the right conduct of the understanding, and the powers of speech in the pursuits of knowledge, or will study the art of reasoning or disputation. The office of philosophy then is threefold, *dialectic, theoretical, and practical.*

For the sum of Plato's doctrine on *dialectics*, as collected from his dialogues, see *DIALECTICA*. The *theoretical* philosophy is divided by Plato into three branches, *viz. theological, physical, and mathematical.*

On *theology*, the fundamental doctrine of Plato, as well as that of other ancient philosophers, is, that from nothing nothing can proceed. This universal axiom, applied not only to the infinite efficient, but to the material cause,

Plato,

Plato, in his "Timæus," lays down as the ground of his reasoning concerning the origin of the world. In this dialogue, which comprehends his whole doctrine on the formation of the universe, matter is so manifestly spoken of as eternally co-existing with God, that this part of his doctrine could not have been mistaken by so many learned and able writers, if they had not been desirous of establishing a coincidence of doctrine between the writings of Plato and of Moses. On the other hand, it is observed by the learned Dr. Cudworth, that though some of the ancient fathers impute to Plato the opinion, that matter was an unmade self-existent being, there seems to be no sufficient ground for their so doing; and Porphyry, Iamblichus, Proclus, and other Platonists, do not only professedly oppose the same as false, but also as that which was dissonant from Plato's principles. However, he acknowledges, that Plato did assert a plurality of gods, meaning animated or intellectual beings, or dæmons, superior to men, to whom honour and worship are due, and applying the appellation to the sun, moon, and stars, and also to the earth. Nevertheless he asserts, at the same time, that there was one supreme God, the self-originated being, the maker of the heaven and earth, and of all those other gods. He also maintains, that the Psyche, or universal mundane soul, which is a self-moving principle, and the immediate cause of all the motion which is in the world, was neither eternal nor self-existent, but made or produced by God in time; and above this self-moving Psyche, but subordinate to the Supreme Being, and derived by emanation from him, which he calls *τὸ ἰσ*, and *τὸ ἀγαθόν*, the good, he supposes an immovable Nous or intellect, which was properly the Demiurgus, or former of the world.

The first matter of which this body of the universe was formed, he observes, was a rude undigested heap, or chaos: now, adds he, the creation was a mixed production; and the world is the result of a combination of necessity and understanding, *i. e.* of matter, which he calls necessity, and the divine wisdom; yet so that mind doth rule over necessity: and to this necessity he ascribes the introduction and prevalence both of moral and natural evil; maintaining, however, that the evils resulting from the necessity of imperfect beings are over-ruled by Mind or God for good.

The principles, or elements which Plato lays down are fire, air, water, and earth.

He supposes two heavens, the *empyrcan*, which he takes to be of a fiery nature, and to be inhabited by angels, &c.; and the *starry* heaven, which he teaches is not adamantine, or solid, but liquid and spirable.

Although Plato, in his "Timæus," as other writers argue, calls God "the parent of the universe;" and in his "Sophista," speaks of him as "creating animate and inanimate beings, which did not before exist;" yet these expressions do not necessarily imply that no prior matter existed, from which these new beings were formed. Through the whole "Timæus," Plato supposes two eternal and independent causes of all things: one, that by which all things are made, which is God; the other, that from which all things are made, which is matter. He distinguishes between God, matter, and the universe; and supposes the architect of the world to have formed it out of a mass of pre-existent matter. According to Plato, matter is an eternal and infinite principle, originally of no form, yet capable of receiving any, and infinitely divisible; but his notion of it is essentially different from that which supposes it to consist of small indivisible particles; and, therefore, Plato is not to be ranked among the Atomic philosophers. Plato also maintains, that there is in matter a necessary, but

blind and refractory force; and that hence arises a propensity in matter to disorder and deformity, which is the cause of all the imperfection which appears in the works of God, and the origin of evil. See *EVIL*.

The principle opposite to matter, in the system of Plato, is God, an intelligent cause, the origin of all spiritual being, and the former of the material world; whose nature he thought it difficult to discover, and, when discovered, impossible to divulge. The existence of God he inferred from the marks of intelligence, which appear in the form and arrangement of bodies in the visible world; and from the unity of the material system he concluded, that the mind by which it was formed must be one. God, according to Plato, is the supreme intelligence, incorporeal, without beginning, end, or change, and capable of being perceived only by the mind. Plato ascribes to the Deity all those qualities which modern philosophers attribute to immaterial substance, and conceives him to be in his nature simple, un-circumscribed in space, the author of all regulated motion, and, in fine, possessed of intelligence in the highest perfection. Whatever were Plato's notions of the essence of Deity, he ascribed to him wisdom and power sufficient for the formation and preservation of the world, and supposed him possessed of goodness, which inclined him to desire, and, as far as the refractory nature of matter would permit, to produce, the happiness of the universe. This great being is distinguished by the appellation *Τὸ Ἀγαθόν*, the Good. "God, that he might form a perfect world," says Plato, followed that eternal pattern, which remains immutable, and which can only be comprehended by reason." But this pattern, or archetype, he has explained so obscurely, that his interpreters and followers have been led to adopt very different opinions concerning it. Some have inferred from various passages that occur in his writings, that the whole of Plato's doctrine, with respect to the formation of the world, amounts to nothing more than that the Deity employed his understanding or reason in planning and executing the system of the universe; and, consequently, that by ideas existing in the reason of God are only meant conceptions formed in the divine mind. But by ideas Plato appears to have meant something much more mysterious; namely, patterns, or archetypes, subsisting by themselves, as real beings, *οὐκ ὄντα*, in the divine reason, as in their original and eternal region, and issuing thence to give form to sensible things, and to become objects of contemplation and science to rational beings. It is the doctrine of the "Timæus," that *ὁ λογισμὸς τοῦ θεοῦ*, the reason of God, comprehends examples of all things, and that this reason is one of the primary causes of things. Plutarch says, that Plato supposes these principles God, matter, and idea. Justin Martyr, Pseudo-Origen, and others, assert the same. These ideas Plato defines to be the peculiar natures of things, or essences as such; and asserts, that they always remain the same, without beginning or end. Plato, having been from his youth conversant with Cratylus, a disciple of Heraclitus, and instructed in the doctrine of that school, that all sensible things are variable, and cannot be proper objects of science, reasonably concluded, that if there be any such thing as science, there must exist, besides sensible objects, certain permanent natures, perceptible only by the intellect. Such natures, divine in their origin, and eternal and immutable in their existence, he admitted into his system, and called them ideas. These objects of contemplation and science Plato seems to have found in the school of Pythagoras, whose numbers agreed in many leading characters with the ideas of Plato, and were employed for the same purposes, namely, to furnish objects of true science, and to elevate the human mind

mind to a resemblance to the divine. Plato compares the state of the human mind, with respect to the material and the intellectual world, to that of a man, who, in a cave into which no light can enter but by a single passage, views, upon a wall opposite to the entrance, the shadows of external objects, and mistakes them for realities. See the article PERCEPTION.

It was another doctrine in the Platonic system, that the deity formed the material world after a perfect archetype, which had eternally subsisted in his reason, and endued it with a soul. This Plato supposed to be the animating principle in the universe, pervading and adorning all things. This third principle in nature is, in the Platonic system, inferior to the Deity, being derived from that divine reason, which is the seat of the ideal world; thus essentially differing from the Stoical doctrine of the soul of the world, which supposed the essence of the divine nature diffused through the universe. The doctrine of a twofold soul of the world, the one *υπερκοσμιον*, presiding over it, the other *εγκοσμιον*, residing in it, is an appendage to the ancient Platonic system, introduced by the later Platonists, to accommodate this system to the notions adopted by many of the Christian fathers concerning the divine nature. But Plato's doctrine concerning God and the soul of the world differs materially from the doctrine of the Trinity, afterwards received in the Christian church. Plato did not suppose three substances in one divine essence, separate from the visible world; but he taught, that the *λογος*, or reason of God, is the seat of the intelligible world, or of ideas, and that the soul of the world is a third subordinate nature, compounded of intelligence and matter. In the language of Plato, the universe, being animated by a soul which proceeds from God, is the son of God; and several parts of nature, particularly the heavenly bodies, are Gods. He probably conceived many subordinate divinities to have been produced at the same time with the soul of the world, and imagined that the Supreme Being appointed them to the charge of forming animal bodies, and superintending the visible world; a doctrine which he seems to have borrowed from the Pythagoreans, and particularly from Timæus the Locrian, who says, "the ruler of all assigned the inspection of human affairs to dæmons, and committed to them the government of the world."

On the foundation of the doctrine, above explained, concerning God, matter, ideas, the soul of the world, and dæmons, Plato raised the structure of his physics: thinking, that the supreme Architect, by uniting eternal and immutable ideas or forms to variable matter, produced the visible world; and believing, that the world had a beginning in time, and not to have existed from eternity.

Other tenets included in the Platonic doctrine of nature were, that the universe is one animated being, including within its limits all animated natures; that fire and earth were first formed, and afterwards united by means of air and water; that from perfect parts one perfect whole was produced, of a spherical figure, as in itself most beautiful, and best adapted to contain all other figures; that the elementary parts of the world are of regular geometrical forms, the particles of earth being cubical, those of fire pyramidal, those of air in the form of an octahedron, and those of water in that of an icosaedron; that these are adjusted, in number, measure, and power, in perfect conformity to the geometrical laws of proportion; that the soul which pervades this sphere is the cause of its revolution round its centre; and, lastly, that the world will remain for ever, but that, by the action of its animating principle, it accomplishes certain periods, within which every thing returns to

its ancient place and state. This periodical revolution of nature is called the PLATONIC, or *Great, year*.

Plato's doctrine concerning the human soul, as an emanation from God, is treated obscurely. This emanation was not immediate, but through the intervention of the soul of the world, debased by some material admixture; and consequently the human soul, receding farther from the first intelligence, is inferior in perfection to the soul of the world. The human soul, in the material part of its nature, is formed for conversing with sensible objects, and, in its intellectual part, capable of spiritual contemplation; but what he meant by *οχημα*, the material vehicle of the soul, is uncertain. The relation which the human soul, in its original constitution, bears to matter, Plato appears to have considered as the source of moral evil. As to the manner in which the soul acts on the body, Plato speaks obscurely and inconsistently; but it is probable, that, as he conceived the soul of the world to produce the motion of the earth, and the heavenly bodies, by means of that part of its nature which is material; so he supposed the power of moving bodies, which belongs to the human soul, to be the effect of its material principles. With regard to the origin and present state of human souls, Plato supposes, that when God formed the universe, he separated from the soul of the world inferior souls, equal in number to the stars, and assigned to each its proper celestial abode; but that these souls, by some means, or for some reason or other not explained, were sent down to the earth into human bodies, as into a sepulchre or prison; and to this cause he ascribes the depravity and misery to which human nature is liable; maintaining, at the same time, that by disengaging itself from all animal passions, and rising above sensible objects to the contemplation of the world of intelligence, the soul of man can be prepared to return to its original habitation. According to Plato, the soul consists of three parts, *viz.* the seat of intelligence, that of passion, and that of appetite; and he assigns to each its proper place in the human body. The first of these portions or faculties of the soul, under both which denominations he speaks of them, he conceived to have been derived from God; the second and third from matter. Plato teaches, in express terms, the doctrine of the immortality of the rational soul, resting the proof of this doctrine, however, upon arguments drawn from the mere fanciful parts of his system.

Plato was a zealous advocate for the importance of that kind of science, which is purely speculative, and though he has left no direct treatise on mathematics, he requires from his disciples an acquaintance with the elements of this branch of knowledge, preparatory to the study of theoretical philosophy. On the subjects of policy and morals he prescribes rules, which are intended for the direction of societies and individuals in the offices of life, but they are too much tinged with his theoretical doctrines. The main object of his political institutions, appears to have been the subjugation of the appetites and passions, by means of the abstract contemplation of ideas. The chief heads of his moral doctrine are as follow: Our highest good consists in the knowledge and contemplation of the first good, which is mind, or God. All those things which are called good by men, are really such only so far as they are derived from the first and highest good. The only power in human nature, which can acquire a resemblance to the Supreme good, is reason. The minds of philosophers are fraught with valuable treasures; and, after the death of the body, they shall be admitted to divine entertainments; so that whilst with the gods they are employed in surveying the fields of truth, they will look down with contempt on the folly of those, who are con-

tented

tented with earthly shadows. Goodness and beauty consist in the knowledge of the first good, and the first fair. That only which is becoming is good; therefore virtue is to be preferred for its own sake; and, because it is a divine attainment, it cannot be taught, but it is the gift of God. He alone, who has attained the knowledge of the first good, is happy; the end of this knowledge is, to render man as like to God as the condition of human nature will permit. This likeness consists in prudence, justice, sanctity, temperance. In order to attain this state, it is necessary to be convinced, that the body is a prison, from which the soul must be released, before it can arrive at the knowledge of those things which are real and immutable. Virtue is the most perfect habit of mind which adorns the man, and renders him firm, resolute, and consistent, in action and speech, in solitude and society. The virtues are so nearly allied, that they cannot be separated: they are perfect, and therefore neither capable of increase, nor of diminution. The passions are motions of the soul, excited by some apparent good or evil: they originate in the irrational parts of the soul, and must be regulated and subdued by reason. Friendship is, strictly speaking, reciprocal benevolence, which inclines each party to be as solicitous for the welfare of the other, as for his own. This equality of affection is created and preserved by a similarity of disposition and manners. Upon the whole it may be observed, that whilst the writings of Plato contain many just and sublime sentiments on moral subjects, his ethical doctrine, duly examined, will appear to be, in some particulars, defective, and in others extravagant and absurd. The fanciful notions which he entertained concerning the divine nature, the world of ideas, and matter, seem to have given a romantic and enthusiastic turn to his conceptions on morals; a defect, which may be in part ascribed to his connection with the Pythagorean school, but which was, perhaps, chiefly owing to the peculiar propensity of his genius towards metaphysical fiction.

After the death of Plato, two of his principal disciples, Aristotle and Xenocrates, continuing his office, and teaching, the one in the ACADEMY, and the other in the LYCEUM, founded two sects, under different names, though in other respects the same; the one retaining the denomination of ACADEMICS, the other assuming that of PERIPATETICS. The Academic sect fell into general neglect under the Roman emperors; partly because it was treated with contempt by the dogmatists, and partly on account of the reviving credit of the Sceptic sect, in which the peculiar tenets of the Middle Academy were embraced. Nevertheless, the true doctrine of Plato, which had formerly obtained such high esteem among philosophers, and which had been lately restored at Athens by Antiochus, resumed its honours. Among the genuine followers of Plato, we find, at this period, several illustrious names. Under the emperors Augustus and Tiberius, flourished Thrasylus, a Mendesian, who, though an eminent Platonist, so far conformed to the practice of the Pythagoreans, as to become an adept in the art of astrology. Not long after his time lived Theon of Smyrna; to whose astronomical observations, Ptolemy the astronomer, who flourished under Antoninus Pius, has referred, and whose mathematical treatises, elucidating the writings of Plato, prove that he belonged to the Platonic school. At the same time, his discourses in geometry, arithmetic, music, astronomy, and the harmony of the universe, serve to cast some light upon the Pythagorean system. Alcimus, whose age is uncertain, but commonly placed about the beginning of the second century, wrote an introduction to Plato, containing a summary of his doctrine, which shews him to have been well acquainted with his phi-

losophy. Favorinus, a native of Arles, lived in the reigns of Trajan and Adrian, and was well instructed in the precepts of philosophy by Epictetus, the illustrious ornament of the Stoical school; but none of his writings are extant. Under the reign of Antoninus Pius flourished Calvisius Taurus of Beryta, and he is mentioned as a Platonist of some note. He wrote several pieces, chiefly to illustrate the Platonic philosophy; he lived at Athens, and taught, not in the schools, but at his table. Aulus Gellius was frequently one of his guests, and in his "Noctes Atticæ" has given an account of the manner in which these philosophical entertainments were conducted. The same period produced Lucius Apuleius; see his article. Another Platonist, who flourished under M. Aurelius Antoninus, was Atticus; chiefly memorable for the laudable pains with which he endeavoured to ascertain the exact points of difference between the doctrines of Plato and Aristotle. (See ATTICUS.) Numenius of Apamea in Syria belonged to the same class of writers with Atticus; and Maximus Tyrius, though chiefly distinguished by his eloquence, obtained some degree of celebrity as a philosopher; and his elegant Dissertations are for the most part written upon Platonic principles, though they sometimes incline towards scepticism. Plutarch and Galen are also commonly ranked among the Platonists. See their respective articles.

In later times, about the first ages of the Christian church, the followers of Plato abandoned the title of "Academics" or "Academists," and assumed that of "Platonists." It is supposed to have been at Alexandria, in Egypt, that they first assumed their new title, after having restored the ancient Academy, and re-established Plato's sentiments; many of which, in process of time, had been laid aside. Among the Greek Platonists, those who acquired the greatest reputation were Porphyry, Plotin, Iamblichus, Proclus, and Plutarch; and among the Latins, Apuleius and Chalcidius. Among the Hebrews, Philo Judæus occupied the chief rank. The modern Platonists were Plotin, the founder, at least the reformer of their sect.

It is certain, that most of the celebrated fathers were Platonists, and borrowed many of their explanations of scripture from the Platonic system. In order to account for this fact, we may observe, that, towards the conclusion of the second century, a new sect of philosophers, called the modern, or later Platonics, arose of a sudden, spread with amazing rapidity through the greatest part of the Roman empire, swallowed up almost all the other sects, and proved extremely detrimental to Christianity. The school of Alexandria in Egypt, instituted by Ptolemy Philadelphus, renewed and reformed the Platonic philosophy. The votaries of this system distinguished themselves by the title of Platonics, because they thought that the sentiments of Plato, concerning that most noble part of philosophy, which has the Deity and things invisible for its objects, were much more rational and sublime than those of the other philosophers. This new species of Platonism was embraced by such of the Alexandrian Christians as were desirous to retain, with the profession of the Gospel, the title, the dignity, and the habit of philosophers.

Those Alexandrian philosophers, who became converts to the Christian faith, retained a strong predilection for Platonic tenets, and the highest reverence for the name of Plato; and therefore they easily credited the report, that the doctrine of Plato concerning the divine nature had been derived from revelation; and hence they thought themselves justified in attempting a coalition between Plato and Jesus Christ. An union of Platonic and Christian doctrines was unquiet-

unquestionably attempted in the second century by Justin Martyr, Athenagoras, and Clemens Alexandrinus, in whose writings we frequently meet with Platonic sentiments and language; and it is not improbable, that this corruption took its rise at a still earlier period.

Ammonius Saccæ was the principal founder of this new Platonic system, and was succeeded by his disciple Plotinus, as he was by Porphyry, the chief of those formed in his school. (See ECLECTICS.) From the time of Ammonius, who, in order to recommend his Eclectic system to the attention of Christians, accommodated his language to the opinions which were then received among them, until the sixth century, this was almost the only system of philosophy that was publicly taught at Alexandria. Origen, and other Christians who studied in his school, were so far duped by the artifice of Saccæ, as to imagine that they discovered, in the system of the Platonists, traces of a pure doctrine concerning the divine nature, which, on the ground just mentioned, they thought themselves at liberty to incorporate into the Christian faith. Entering upon the office of Christian teachers, under the bias of a strong partiality for Plato and his doctrine, they tinged the minds of their disciples with the same prejudice, and thus disseminated Platonic notions, as Christian truths; little aware, without doubt, how far this practice would corrupt the purity of the Christian faith, and how much confusion and dissension it would occasion in the Christian church.

The Platonic system of philosophy was brought into Greece by Plutarch, who renewed at Athens the celebrated Academy, from whence issued many illustrious philosophers. The general principles on which this sect was founded, however the partisans of it might differ with respect to particular opinions, was, that truth was to be pursued with the utmost liberty, and to be collected from all the different systems in which it lay dispersed. None, however, who were ambitious to be ranked among these new Platonists, called in question the main doctrines; those, for example, which regarded the existence of one God, the fountain of all things; the eternity of the world; the dependence of matter upon the Supreme Being; the nature of souls; the plurality of gods; the method of interpreting the popular superstitions, &c.

That the reader may be able to trace distinctly the introduction and progress of this new Platonic system in the Christian church, we shall divide the Christian fathers into two classes; namely, those who flourished before and those who flourished after the institution of the Eclectic sect. (See ECLECTICS.) The first class commences with Justin Martyr, and the second with Origen. Justin Martyr, (see JUSTIN MARTYR,) after his conversion, retained a strong attachment to the Platonic system, and applied his knowledge of this system to the illustration and defence of the Christian doctrine. Perceiving an agreement between Platonism and Christianity, he concluded that whatever was valuable in the former, had either been communicated to Plato by inspiration, from the Logos, or first emanation of the divine nature, or had been transmitted by tradition from Moses and the Hebrew prophets, and might therefore be justly claimed as belonging to divine revelation, and incorporated into the Christian creed. By the term Logos he understood, not the reasoning faculty of the human mind, but, after Plato, the emanating reason of the divine nature; and he conceived this divine reason to have inspired the Hebrew prophets, and to have been the Christ who appeared in the flesh. He moreover apprehended, that it had been participated not only by the Hebrew patriarchs, but by the more excellent Pagan philosophers; and consequently he regarded every tenet in

the writings of the Heathens, which he could reconcile with the doctrine of Christ, as a portion of divine wisdom which Christians might justly appropriate to themselves. Having learned from Plato and his followers, in the schools of Alexandria, that the knowledge of God is alone to be gained by the contemplation of ideas, which have their primary seat in the divine Logos, and that the human mind, in consequence of its nature as proceeding from the foul of the world, is capable of contemplating those divine ideas by means of which it may ascend to the knowledge of God, Justin was necessarily led to conclude, that man can only arrive at divine science through the medium of the Logos. Hence, he referred all Christian knowledge to the perception of the divine reason inhabiting in man; and thus laid the foundation of an error, still retained by some Christian sects, that Christ, or the Word, is a substantial ray of divine light internally communicated to man. Justin also borrowed from Plato his notion of angels employed in the government of the elements, the earth, and the heavens, and many other tenets that are not to be found in the scriptures. The sentiments and language of Tatian, who, after his conversion from Heathenism to Christianity, became a disciple of Justin Martyr, perfectly agree with those of the Egyptian and Cabalistic philosophy, and were probably derived from those sources. The whole tenour of his Apology concurs with what is known of his history to prove, that he was a Platonic Christian. See TATIAN.

Several things in the Apology of Theophilus of Antioch (see his article), discover his predilection for the Platonic system, and his inclination to adapt it to the Christian doctrine. We may also rank among the Platonizing fathers, Athenagoras. (See ATHENAGORAS.) Another writer of this period, viz. Irenæus, seems to have borrowed his ideas and language from the Alexandrian Platonists. About the beginning of the third century flourished Tertullian, who frequently makes use of Platonic notions and language; but none of the fathers of this period merit higher distinction than Clemens Alexandrinus; nor was any one of them led farther astray, by philosophical subtlety, from the simplicity of the Christian faith. We frequently find him adopting Platonic and Stoic tenets as Christian doctrines, and thus sowing the seeds of error in the Christian church. The most celebrated of the Christian fathers, after Ammonius, who, following the idea of Potamo, framed the Eclectic system, was Origen; and among other names which distinguish this period, the principal are Arnobius, Lactantius, Eusebius Pamphilus, Didymus of Alexandria, and Augustine. See their respective articles.

In the fourth century, under the reign of Valentinian, a dreadful storm of persecution arose against the Platonists; many of whom, being accused of magical practices, and other heinous crimes, were capitally convicted. In the fifth century Proclus gave new life to the doctrine of Plato, and restored it to its former credit in Greece; with whom concurred many of the Christian doctors, who adopted the Platonic system; among the more eminent of whom we may reckon Synesius, an African bishop. The Platonic philosophers were, in general, opposers of Christianity; but in the sixth century, Chalcedius, whose conversion to Christianity has been doubted, gave the Pagan system an evangelical aspect; and those who, before it became the religion of the state, ranged themselves under the standard of Plato, repaired to that of Christ, without any considerable change of their system. At the beginning of this sixth century appeared Boethius, who was born at Rome and sent to Athens to study philosophy. In the school of Proclus he became acquainted with the Eclectic system; and from the con-

commendations which he bestows upon Porphyry, as the best interpreter of Aristotle, he seems to have united the Platonic with the Aristotelian doctrine. Æneas Gaza, towards the close of the fifth century, in a poem professedly written against the Platonists, confounds the doctrines of Platonism and Christianity. Under the emperor Justinian, who issued a particular edict, prohibiting the teaching of philosophy at Athens, which edict seems to have been levelled at modern Platonism, all the celebrated philosophers of this sect took refuge among the Persians, who were, at that time, the enemies of Rome; and though they returned from their voluntary exile when the peace was concluded between the Persians and Romans, A.D. 533, they could never recover their former credit, nor obtain the direction of the public schools. Thus, says Mosheim, expired that famous sect, which was distinguished by the title of the modern or later Platonists, and which, for a series of ages, had produced such divisions and tumults in the Christian church, and which had been, in other respects, prejudicial to the interests and progress of the Gospel. For a farther account of this sect, see *ELECTICS*.

The knowledge of Alexandrian Platonism was, however, revived in the West by Joannes Scotus, who, in the ninth century, translated the books ascribed to Dionysius the Areopagite, or St. Denys, and laid the foundation of the mystical system of theology, which afterwards so generally prevailed. Thus philosophical enthusiasm, born in the East, nourished by Plato, educated in Alexandria, matured in Asia, and adopted into the Greek church, found its way, under the pretext and authority of an apostolic name, into the western church, and there produced innumerable mischiefs.

The first Greek who gave occasion to the revival of Platonism in Italy, was Gemistius Pletho, a native of Constantinople, who was born in 1390, and lived 100 years. He was a zealous advocate for Platonism, and maintained a violent controversy with the Aristotelians. In his "Expositio Oraculorum Magicorum Zoroastris," he exhibits twelve fundamental articles of the Platonic religion, and gives an elegant compendium of the whole Platonic philosophy. A more moderate adherent to Plato, who maintained his system without casting contempt on the philosophy of Aristotle, or trespassing upon the doctrine of Christianity, was Bessarion, a learned bishop of Nice, who was appointed by the emperor Michael Palæologus, about the year 1440, together with other Greek divines, to treat with the Latin church concerning an union. He died at Ravenna in 1472. He wrote a defence of the Platonic system against George of Trebizond. Under the patronage of Cosmo de Medici, Marsilius Ficinus, a Florentine, born in 1433, was educated by Pletho, for the express purpose of translating the writings of Plato. It appears, however, from the execution of the task assigned him, and his other writings, that he was deficient in strength of judgment and correctness of taste. His Latin style wants that richness and dignity which are requisite in a version of Plato. A fellow labourer with Ficinus, in the task of editing and translating the writings of Plato, was Juannes Picus of Mirandola, born in 1460; who, for his success in reviving the Platonic philosophy, was honoured with the title of the phoenix of his age. Picus was a zealous supporter of Platonism, after the model of the Alexandrian school; but not without blending with its doctrine a large portion of Cabbalistic mystery, and confounding with both these the doctrine of divine revelation. About this period, a body of Greek scholars avowed themselves zealous advocates for the genuine Aristotelian philosophy; and employed their time and learning in editing and translating the

writings of the Stagirite. The principal of those who laboured in this undertaking were Theodore Gaza, George of Trebizond, and Georgius Scholarius. Between these philosophers, on the one part, who followed Plato, and those on the other who followed Aristotle, a dispute arose concerning the merit and authority of their respective masters, which was carried on to a most ridiculous and extravagant height. It was begun by Pletho, whose veneration for Plato led him to oppose with great violence the unrivalled dominion which Aristotle had for ages possessed in the schools. Georgius Scholarius, on the other hand, zealously defended Aristotle, and strenuously maintained that his opinions are consonant to the truest and best doctrines of the Christian religion, and are *even more true*; and that the tenets of Plato, differing from those of Aristotle, are *therefore false*. George of Trebizond supported Scholarius; and Pletho was ably seconded by Gaza. Other combatants also engaged in the contest, and in the prosecution of it exposed themselves to ridicule. The partisans of the Platonic system, who, under the patronage of the Medicæan family, for a long time maintained their ground against the Aristotelians, declining with the fortune of their patrons, the advocates for the Peripatetic philosophy proportionably increased, and after a violent struggle, established a victory.

The doctrines of the later Platonists having been revived by the Greek exiles in Italy, their farther spread is chiefly to be imputed to the aversion which many good men entertained against the Peripatetic philosophy, on account of the shameful impieties to which it had given birth. Perceiving that they could not commit themselves to the direction of Aristotle, without hazarding their religious principles; and not having strength of mind sufficient to form a system of opinions for themselves, they adopted the philosophy of Plato in the corrupted state in which it had been transmitted, through the Alexandrian and Christian schools, to modern times. This philosophy was the more readily embraced, because it was believed, that the mysteries of Pythagoras, than which none appeared to approach nearer to those of true religion, had been long since united with the wisdom of Plato. In this school they expected to find much divine instruction; more especially as they were led to believe, that its doctrines had been, mediately or remotely, derived from divine revelation. And as one error generally produces another, these learned men united with this system the secret or cabbalistic philosophy of the Jews, which, for want of due examination, they conceived to have been the pure doctrine of the ancient Hebrews. Hence arose a new compound of tenets, sufficiently mysterious and paradoxical, which was received by this class of philosophers as the sum of ancient wisdom. Whilst Ficinus was reviving the Platonic philosophy in Italy, and Faber the Aristotelian in France, John Reuchlin, otherwise called Capnio, born at Pforzheim, in Suabia, in 1455, professed and taught a mystical system, compounded of Platonic, Pythagoric, and Cabbalistic doctrines. George Venet, an obscure and enthusiastic writer, pursued a similar course, and blended sundry Peripatetic notions with the Platonic and Cabbalistic systems. The mystic system of Cabbalistic Platonism was ably supported by Henry Cornelius Agrippa. A very different mode of restoring the Platonic philosophy was pursued by Franciscus Patricius, born at Clissa, in Illyricum, in 1529. In the schools of Italy he professed to unite the doctrines of Aristotle and Plato, but in reality undermined that of the former. Being appointed by pope Clement VIII. a preceptor in philosophy at Rome, he openly discovered his aversion to the Aristotelian system, and advised the pope to prohibit the teaching of this philosophy in the schools, and to introduce the doctrine of Plato, as more

consonant to the Christian faith. In the 17th century, Platonism found many advocates in Great Britain, owing, in a great measure, to the desire which many able and learned divines at this time entertained of refuting the tenets of Hobbes; and this they thought could not be more effectually done, than by reviving an attention to the doctrine of Plato, both in his own works, and in those of his followers. Of those who ranged themselves under the banners of Plato, the most celebrated are Gale, Cudworth, and More. Brucker's History of Philosophy, by Enfield, vol. i. and ii. Mosheim's Eccl. Hist.

PLATONISTS. See PLATONISM and ACADEMICS.

PLATONOPOLIS, in *Ancient Geography*, a city which Plotinus requested the emperor Galienus to build in Campania. This city had been formerly razed, and Plotinus used his interest with the emperor, not only to have it rebuilt, but to obtain a grant of the neighbouring territory, that it might be inhabited by a body of philosophers, and governed by the laws of Plato, under the name of Platonopolis. He promised, at the same time, that he and his friends would lay the foundation of this philosophical colony. The emperor was dissuaded by his friends from acceding to this proposal.

PLATOON, or PLOTTOON, formed, by corruption, of the French *peloton*, a bottom, or clue, of thread, in War, formerly denoted a small body of men, drawn out of a battalion of foot, and placed between the squadrons of horse, to sustain them; or in ambuscades, straits, and defiles, where there is not room for whole battalions or regiments.

Platoons were also used when they formed the hollow square, to strengthen the angles.

The grenadiers were generally posted in platoons.

A battalion was generally divided into sixteen platoons, exclusive of the grenadiers, which formed two or four platoons more, as occasion required. At present the battalion is generally divided into wings, grand divisions, divisions (or companies), subdivisions, and sections; and the word platoon is seldom used, except to denote a number (from 10 to 20) of recruits assembled for the purpose of instruction, in which case it may be considered as synonymous with company. See BATTALION.

PLATOON *Exercise*. See BATTALION.

PLATOON *Firing*. See BATTALION and FIRING.

PLATOON *Pivots*. See PIVOT.

PLATTE, or *Shallow River*, in *Geography*, a western branch of the river Missouri, remarkable for its quicksands and bad navigation. Near the confluence of this river with the Missouri, dwells the nation of the Octolactos, or Otos, consisting of about 200 warriors.

PLATTE, *La*, a smaller river of America, in the state of Vermont, which runs into lake Champlain, at Shelburn.

PLATTE *Forme*, *La*, a cape on the W. coast of St. Domingo. N. lat.  $19^{\circ} 36'$ . W. long.  $74^{\circ} 2'$ .—Also, a town on the S. side of the N. peninsula of St. Domingo; 13 leagues S.E. by S. of the Mole.

PLATTEN, a town of Bohemia, in the circle of Leitmeritz; 4 miles E. of Kamnitz.—Also, a town of Bohemia, in the circle of Elnbogen; 27 miles N.E. of Eger. N. lat.  $50^{\circ} 23'$ . E. long.  $12^{\circ} 45'$ .

PLATTENBURG, a citadel of Brandenburg, in the Mark of Pregnitz; 4 miles E. of Wilfnach.

PLATTS, a small island in the Indian sea. S. lat.  $5^{\circ} 55'$ . E. long.  $55^{\circ} 20'$ .

PLATTS, on board a *Ship*. See PLATS.

PLATTSBURG, in *Geography*, a post-town of America, in Clinton county, New York, on lake Champlain; 5 miles W. of Ticonderoga. N. lat.  $44^{\circ} 41'$ . W. long.

$73^{\circ} 27'$ . Here are a house for public worship, a court-house, and a gaol. The court of common pleas and grand sessions of the peace sit here twice a-year; and in the town are artificers of almost every kind, who furnish among themselves all the materials for building, glass excepted. Here also be found polite circles. The number of inhabitants is 1409.

PLATUNIUM, in *Botany*, from  $\pi\lambda\alpha\lambda\upsilon\sigma\iota$ , to dilate or enlarge, in allusion to its large spreading calyx; a genus described by Jussieu, in the *Annales du Muséum*, v. 7. 65, with which we are unacquainted. *De Théis*. 371.

PLATYCEROS OVIS, in *Zoology*, the name given by Gesner and some others to a species of sheep, commonly called *ovis laticauda*, or the broad-tailed sheep. See OVIS.

PLATYCEROS is also a name given by Pliny to the CERVUS *Dama*, or fallow deer.

PLATYCEROS, in *Entomology*, a species of *Lucanus*. See LUCANUS *Alces*, and LUCANUS *parallelepipedus*. See also TENEBRIO *Caraboides*.

PLATYLOBIUM, in *Botany*, so named, by the writer of the present article, from  $\pi\lambda\omega\tau\upsilon\sigma$ , broad, and  $\lambda\omicron\beta\omicron\varsigma$ , a pod or legume; because of the breadth of that part, which is further augmented by a dilatation, or wing, running along the back.—Sm. Tr. of Linn. Soc. v. 2. 350. v. 9. 302. Bot. of New Holl. 17. Willd. Sp. Pl. v. 3. 921. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 4. 266.—Class and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminosæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, bell-shaped, two-lipped; the upper lip rounded, very large, divided half way down into two obovate segments; the under much smaller, in three equal, awl-shaped, straight segments. *Cor.* papilionaceous. Standard heart-shaped, large, ascending, twice as long as the upper lip of the calyx, with a shortish, linear, convex claw. Wings half the length of the standard, obovate, each with a plait, and prominent tooth, at the base on its lower side, and a narrow claw. Keel the length of the wings, of two obovate, concave, converging petals, each with a tooth on its upper edge at the base. *Stam.* Filaments ten, united into one set for about half their length, separate only at the upper edge, ascending; anthers simple, roundish. *Pisl.* Germen on a short stalk, oblong, compressed; style recurved; stigma simple. *Peric.* Legume stalked, oblong, compressed, almost flat, of one cell, its upper edge dilated into a flat longitudinal wing, the valves membranous. *Seeds* several, oval, compressed, each on a curved white stalk, with a tumid appendage.

Ess. Ch. Calyx two-lipped; the upper lip cloven, rounded, very large. Stamens all connected. Legume stalked, compressed flat, membranous, winged at the back, of one cell, with many seeds.

1. *P. formosum*. Orange Flat-pea. Sm. Bot. of New Holl. 17. t. 6. Willd. n. 1. Ait. n. 1. Curt. Mag. t. 469. Venten. Malmaif. t. 31.—Leaves ovate, somewhat heart-shaped. Germen all over hairy. Stalk of the legume shorter than the calyx. Bractæas silky.—Native of New South Wales, from whence specimens, drawings, and seeds, were early sent by Dr. White and others. It is rather difficult to raise and to preserve, but when in perfection proves a great ornament to the greenhouse from June to August. The stem is erect, but very slender, and rather weak, bushy, with numerous, opposite, spreading branches, all of reddish-brown, hairy and round. Leaves opposite, on short stalks, acute, entire, convex, rigid, smooth, about an inch long; glaucous beneath. *Stipulas* in pairs, lanceolate, membranous, brownish. *Flowers* numerous, inodorous, large, on shortish, simple, axillary, crowded stalks, with a pair of bractæas under

the *calyx*, which like them is silky. *Standard* and *wings* of an orange yellow, the former crimson at the back, as well as at the centre in front; wings pale, tipped with crimson. *Legume* an inch and a half long, and half as broad, obtuse, with a little sharp point, somewhat hairy all over.

2. *P. parviflorum*. Small-flowered Flat-pea. Sm. Bot. of N. Holl. 18. Willd. n. 2. Ait. n. 2. Curt. Mag. t. 1520.—Leaves lanceolate-ovate. Germen nearly smooth. Stalk of the legume longer than the calyx. Bractææ smooth.—From the same country. Sent to Kew by Sir J. Banks in 1792. It blooms in the summer, amongst other greenhouse shrubs.

3. *P. triangulare*. Triangular-leaved Flat-pea. Brown MSS. Ait. n. 3. Curt. Mag. t. 1508.—“Leaves somewhat triangular or hastate, with spinous angles. Flower-stalks bracteated at the base and summit, naked in the middle. Legume several times longer than the calyx.—Gathered by Mr. Brown in Van Diemen’s island, and sent to Kew in 1805. It is kept in the greenhouse, and flowers from June to September.

PLATYOPHTHALMON, a name given by some to anatomy, from its use among the ladies of old time, to make their eye-brows broad and black.

PLATYPUS, *Duck-billed Platypus*, in *Zoology*, a genus of the class and order Mammalia Bruta, of which the generic character is; mouth shaped like the bill of a duck; the feet are palmate. There is but a single

#### Species.

ASATINUS. This extraordinary animal is placed by Dr. Shaw next to the genus *Myrmecophaga*. The description of this naturalist, who has taken much pains in investigating the characters of the genus, we shall transcribe, as being the only satisfactory account we have of it. “Of all the mammalia yet known, it seems the most extraordinary in its conformation, exhibiting the perfect resemblance of the beak of a duck engrafted on the head of a quadruped. So accurate is the similitude, that, at first view, it naturally excites the idea of some deceptive preparation by artificial means; the very epidermis, proportion, ferratures, manner of opening, and other particulars of the beak of a shoveler, or other broad-billed species of duck, presenting themselves to the view: nor is it without the most minute and rigid examination that we can persuade ourselves of its being the real beak or snout of a quadruped.

“The body is depressed, and has some resemblance to that of an otter in miniature: it is covered with a very thick, soft, and beaver-like fur, and is of a moderately dark brown above, and of a subferruginous white beneath. The head is flattish, and rather small than large; the mouth or snout, as before observed, so exactly resembles that of some broad-billed species of duck, that it might be mistaken for such: round the base is a flat circular membrane, somewhat deeper or wider below than above, *viz.* below near the fifth of an inch, and above about an eighth. The tail is flat, furry like the body, rather short and obtuse, with an almost bifid termination; it is broader at the base, and gradually tapers to the tip, and is about three inches in length; its colour is similar to that of the body. The length of the whole animal, from the tip of the beak to that of the tail, is thirteen inches; of the beak an inch and a half. The legs are very short, terminating in a broad web, which on the fore feet extends to a considerable distance beyond the claws; but on the hind feet reaches no farther than the roots of the claws. On the fore feet are five claws, straight, strong, and sharp-pointed; the two exterior ones somewhat shorter than the three middle ones. On the hind feet are

five claws, longer and more inclining to a curved form than those on the fore feet; the exterior toe and claw are considerably shorter than the four middle ones; the interior, or sixth, is seated much higher up than the rest, and resembles a strong, sharp spur. All the legs are hairy above; the fore feet are naked both above and below; but the hind feet are hairy above and naked below. The internal edges of the under mandible (which is narrower than the upper) are ferrated or channelled with numerous striæ, as in a duck’s bill. The nostrils are small and round, and are situated about a quarter of an inch from the tip of the bill, and are about the eighth of an inch distant from each other. There is no appearance of teeth; the palate is removed, but seems to have resembled that of a duck; the tongue also is wanting in the specimen. The ears or auditory foramina are placed about an inch beyond the eyes; they appear like a pair of oval holes of the eighth of an inch in diameter, there being no external ear. On the upper part of the head, on each side, a little beyond the beak, are situated two smallish oval white spots, in the lower part of each of which are imbedded the eyes, or at least the parts allotted to the animal for some kind of vision; for from the thickness of the fur, and the smallness of the organs, they seem to have been but obscurely calculated for distinct vision, and are probably like those of moles, and some other animals of that tribe; or perhaps even subcutaneous; the whole apparent diameter of the cavity in which they were placed not exceeding the tenth of an inch. When we consider the general form of this animal, and particularly its bill and webbed feet, we shall readily perceive that it must be a resident in watery situations; that it has the habits of digging or burrowing in the banks of rivers, or under ground; and that its food consists of aquatics, plants, and animals. This is all that can at present be reasonably guessed at: future observations, made in its native regions, will, it is hoped, afford us more ample information, and will make us fully acquainted with the natural history of an animal which differs so widely from all other quadrupeds, and which verifies, in a most striking manner, the observations of Buffon, *viz.* that whatever was possible for nature to produce, has actually been produced.”

Dr. Shaw observes, in a subsequent volume, as the result of more accurate experiments, that “on laying open the parts beyond the base of the bill, it appears that the platypus, like the ant-eaters, is furnished with small bony processes resembling grinding-teeth, imbedded in the gum, but not fastened or rooted in the jaw: of these processes, there are two on each side both of the upper and under jaw.” Shaw’s Gen. Zool. vol. i. and ii.

PLATYRYNCHIOS, in *Ichthyology*, a name given by some to the naseus, or nase, a fresh-water fish, caught in the Danube, and most of the large rivers in Germany, and much resembling the chub. See *CYPRINUS Naseus*.

PLATYSMA MYOIDES, in *Anatomy*, the thin stratum of muscular fibres placed immediately under the skin in the neck. It is described in the article *DEGLUTITION*, under the name of *latissimus colli*.

PLATYSTERNOS, a word used by the old physicians to express a person with a very broad chest or sternum.

PLATYZOMA, in *Botany*, from *πλατος*, broad, and *ζωμα*, a bell, a genus of *Filices* in Mr. Brown’s Prod. Nov. Holl. v. 1. 160, nearly allied to *Gleichenia*, from which the author says he was induced to separate it, rather on account of its undivided stalks, which in *Gleichenia* are forked, than for the slight difference in the fructification. The latter seems principally to consist in the revolute margins of the leaflets forming a sort of *involutum*.

The only species mentioned is

1. *P. microphyllum*.—Found in the tropical parts of New Holland. A smooth fern, with a creeping scaly root. Stalks undivided. Fronds pinnate; leaflets extremely numerous, distinct, orbicular, entire, minute, covered beneath with sulphur-coloured powder. Capsules few together in each dot. Seeds rather large. Some fronds, from the same root, are compressed, nearly thread-shaped, and undivided. See *GLEICHENIA*.

PLATZ, in *Geography*, a town of Bohemia, in the circle of Bechin; seven miles W. of Fifritz.

PLAU, or PLAUEN, a town of the duchy of Mecklenburg, on a lake called the "Plauer See;" 15 miles E. of Parchim. N. lat. 53° 50'. E. long. 12° 23'.

PLAVA, a town of Servia; 20 miles S.W. of Jenibafar.

PLAUEN, a town of Saxony, in the county of Schwartzburg, on the Gera; 16 miles N.W. of Schwartzburg. N. lat. 50° 45'. E. long. 11° 2'.—Also, a town of Saxony, in the Vogtland, on the Elster, in which is a manufacture of cotton and cloth; 22 miles S.W. of Zwickau. N. lat. 50° 23'. E. long. 12° 8'.—Also, a town of Brandenburg, in the Middle Mark, seated on a lake formed by the Havel, which gives name to a canal that runs from thence to the Elbe. This town has a manufacture of porcelain; six miles W. of Brandenburg. N. lat. 52° 29'. E. long. 12° 30'.

PLAUER SEE, a lake of the duchy of Mecklenburg, about 20 miles in circumference; E. of Plau.

PLAUSCHNITZ, a town of Bohemia, in the circle of Boleslaw; three miles E.S.E. of Turnau.

PLAUSEN, a town of Prussia, in Ermeland; 14 miles E. of Heilsberg.

PLAUSUS, among the Romans. See *ACCLAMATION*.

PLAUTEN, in *Geography*, a town of Prussia, in Oberland; 16 miles S.E. of Marienwerder.

PLAUTUS, MARCUS ACCIUS, in *Biography*, a celebrated Latin writer of comedy, was a native of Sarfina, a small town in Umbria. He was thought not only to have been of mean parentage, but the son of a slave. Few facts have come down to us that at all illustrate his life. He came to Rome, and obtained not only fame but emolument from his dramatic compositions, which were reprinted about a century and a half before the Christian era. Plautus is said to have acquired considerable property, and to have been tempted, in order to increase it, to engage in trade, but that, like many other literary speculators, he succeeded so ill, that he was reduced to so great poverty, as to hire himself as a labourer to grind in a mill. Yet even in this toilsome situation his mind remained undepressed, and he composed three comedies. He died in the year 184 B.C. Anciently a great number of comedies were current under the popular name of Plautus, but of these the greater number was merely retouched by him, and the best Roman critics admitted only about twenty-five of his genuine compositions. Twenty of these are still extant, but some of them are in a mutilated state. Of the character they bore among his countrymen we have the most decided testimony. The learned Varro said, if the Muses were to speak Latin, they would use no other style than that of Plautus. By Cicero the wit of Plautus is called elegant, refined, ingenious, and facetious. "To a modern reader," says an able critic, "the humour of Plautus will often appear strong and genuine, but coarse and indelicate, and intermixed with quibbles and witticisms. His plays are, however, lively, and generally entertaining, and the language is a rich treasury of the Latin tongue. Many of his pieces, like those of

the other dramatists, are professed translations from the Greek, and it is probable that all his plots are borrowed from the Grecian theatre." The best editions of Plautus are the *Variorum* by Gronovius.

PLAUZAT, in *Geography*, a town of France, in the department of the Puy de Dôme; 10 miles S. of Clermont Ferrand.

PLAY, LUSUS. See *GAME*, and *GAMING*.

PLAY, in the *Doctrine of Chances*, is used for the probability of the play's ending in a given number of games.

PLAY, in *Poetry*, &c. See *DRAMA*, *TRAGEDY*, *COMEDY*, &c.

PLAYFORD, JOHN, in *Biography*, a stationer and musician, feller of musical books and instruments, and clerk of the Temple church.

In 1655 he published the first edition of his "Introduction to the Skill of Music," a compendium compiled from Morley, Butler, and other more bulky and abstruse books, which had so rapid a sale, that, in 1683, ten editions of it had been circulated through the kingdom. The book, indeed, contained no late discoveries or new doctrines, either in the theory or practice of the art; yet the form, price, and style, were so suited to every kind of musical readers, that it seems to have been more generally purchased and read, than any elementary musical tract that ever appeared in this or in any other country.

John Playford was born in the year 1613, and seems, by what means is now not known, to have laid in a considerable stock of musical knowledge, previous to becoming the vender of the chief productions of the principal composers of the time. As he was the first, so he seems the most intelligent printer of music during the seventeenth century; and he and his son Henry appear to have acquired the esteem of the first masters of the art; and without a special licence, or authorized monopoly, to have had almost the whole business of furnishing the entire nation with musical instruments, music books, and music paper, to themselves; as, during more than the first fifty years of the last century, Wallis and his son had afterwards.

In 1655, this diligent editor also published, in two separate books, small 8vo. "Court Ayres, by Dr. Charles Colman, William Lawes, John Jenkins, Simpson, Child, Rogers, &c."

These being published at a time when there was properly no court, were probably tunes which had been used in the masques performed at Whitehall during the life of the late king.

It was honest John Playford who new strung the harp of David, and published, in 1671, the first edition of his "Psalms and Hymns in solemn Musick, in four Parts on the common Tunes to Psalms in Metre used in Parish-churches. Also six Hymns for one Voice to the Organ," folio. The several editions of this work published in various forms, at a small price, rendered its sale very general, and psalm-singing in parts, a favourite amusement in almost every village in the kingdom.

PLAYFORD, HENRY, the second son of John, succeeded his father as a music feller, at first at his shop in the Temple, but afterwards in the Temple Exchange, Fleet-street.

The music books advertised by him were but few compared with those published by his father. Among them were the *Orpheus Britannicus*, and the ten sonatas and airs of Purcell.

Henry Playford published, in 1701, what he called the second book of the "Pleasant Musical Companion, being a choice collection of catches for three or four voices; published chiefly for the encouragement of the musical societies which

which will be speedily set up in the chief cities and towns of England."

We know not what effect this advertising title-page had upon the nation, but believe that the publication of Purcell's catches in two small volumes of the elder Walsh in queen Anne's time, was the means of establishing catch clubs in almost every town in the kingdom, where tobacco, ale, and psalm-singing were to be found.

It is conjectured that Henry Playford survived his father but a short time, for we meet with no publication by him after 1710.

PLAY-HOUSE. See THEATRE, AMPHITHEATRE, &c.

The most ancient English play-houses were the Curtain in Shoreditch, and the Theatre. In the time of Shakspeare, who commenced a dramatic writer about the year 1592, there were no less than ten theatres open, four private houses, and six that were called public theatres. Most, if not all of Shakspeare's plays, were performed either at the Globe, which was an hexagonal building, partly open to the weather, and partly covered with reeds, on the southern side of the river Thames, called the Bank-side, and a public theatre, where they always acted by day-light; or at the theatre in Black-friars, which was a private play-house, and where plays were usually represented by candle-light. Both these belonged to the same company of comedians, viz. his majesty's servants, which title they assumed after a licence had been granted to them by king James, in 1603; having before this time been called the servants of the lord chamberlain. The exhibitions at the Globe seem to have been calculated chiefly for the lower class of people, and those at Black-friars for a more select and judicious audience. The former was a summer, and the latter a winter theatre. Many of our ancient dramatic pieces were performed in the yards of carriers' inns, in which, in the beginning of queen Elizabeth's reign, the comedians, who then first united themselves in companies, erected an occasional stage. The form of these temporary play-houses seems to be preserved in our modern theatres. Many circumstances concur to render it probable, that our ancient theatres, in general, were only furnished with curtains, which opened in the middle, and a single scene composed of tapestry, sometimes ornamented with pictures. In the year 1605, Inigo Jones exhibited an entertainment at Oxford, in which moveable scenes were used; but they were not then used in the public theatres. When sir William Davenant first opened, by virtue of his patent, the duke of York's theatre in Lincoln's-inn-fields, in the spring of the year 1662, with one of his own plays, the Siege of Rhodes, then scenes made their first appearance upon the English stage; and about the same time actresses were also introduced, probably by him, in imitation of the foreign theatres; and Mrs. Betterton is said to have been the first woman that appeared on the English stage. Before this time, female characters were represented by boys or young men. In the time of Shakspeare plays began at one o'clock in the afternoon, and the exhibition was usually finished in two hours; and so late as 1667, they commenced at three o'clock. See Malone's Supplemental Observations to Stevens's edition of Shakspeare.

If any persons shall in plays, &c. jestingly or prophanely use the name of God, they shall forfeit 10*l.* (Stat. 1 Jac. I. cap. 21.) And players speaking any thing in derogation of religion, &c. are liable to forfeitures and imprisonment. (1 Eliz.) Also acting plays or interludes on a Sunday is subject to penalties, by 1 Car. I. cap. 1. No person shall act any new play, or an addition to an old one, &c. unless a true copy thereof, signed by the master of the play-house,

be sent to the lord chamberlain fourteen days before it be acted, who may prohibit the representing any stage play; and persons acting contrary to such prohibitions shall forfeit 50*l.* and their licences, &c. (Stat. 10 Geo. II. cap. 28.) And by this statute, no licence is to be given to act plays, but in the city and liberties of Westminster, or places of his majesty's residence. Ibid.

PLAZIA, in *Botany*, a genus in the Flora Peruviana, p. 92, named after John Plaza, a Spanish botanist, mentioned respectfully by Clusius. *De Theis.* 371.

PLEA, PLACITUM, in *Law*, that which either party allegeth for himself in court, in a cause then depending to be tried.

Pleas are either of *the crown*, or *common pleas*.

PLEAS of *the Crown* comprehend all crimes and misdemeanors, in which the king, on behalf of the public, is the plaintiff. Such are treasons, felonies, misprisions of either, and mayhem.

PLEAS, *Common*, include all civil actions depending between subject and subject. The former of these were the proper object of the jurisdiction of the court of king's bench; the latter of the court of common pleas.

PLEAS are of two sorts; viz. *dilatory* pleas, and pleas *to the action*. For an account of dilatory pleas, see DILATORY.

Pleas *to the action*, are such as dispute the very cause of suit.

A plea to the action is to answer to the merits of the complaint; which is done either by confessing or denying it. (See CONFESSION of *action*.) To this head may be referred the practice of what is called a "set-off;" by which the defendant acknowledges the justice of the plaintiff's demand on the one hand; but on the other, sets up a demand of his own to counterbalance that of the plaintiff, either in the whole or in part; as if the plaintiff sues for ten pounds due on a note of hand, the defendant may set off nine pounds due to himself for merchandize sold to the plaintiff, and in case he *pleads* such set-off, must pay the remaining balance into court. This answers very nearly to the *compensatio*, or *stoppage*, of the civil law (Ff. 16. 2. 1.), and depends on the statutes 2 Geo. II. c. 22. and 8 Geo. II. c. 24. which enact, that where there are mutual debts between the plaintiff and defendant, one debt may be set against the other, and either pleaded in bar, or given in evidence upon the general issue at the trial; which shall operate as payment, and extinguish so much of the plaintiff's demand.

Pleas that totally deny the cause of complaint are either the *general*, or a *special* plea, in bar. The *general* issue, or general plea, traverses, thwarts, and denies at once the whole declaration, without offering any special matter whereby to evade it. Thus, in debt on contract, it is, *nihil debet*, he owes nothing; in debt on bond, *non est factum*, it is not his deed; in action of the case upon a promise, *non assumpsit*, he hath not promised; in trespass upon the case, *not guilty*; in covenant, *performance of covenants*, &c. In real actions, *nul sort*, no wrong done; *nul disseisin*, no disseisin; and in a writ of right, that the tenant has more right to hold than the demandant has to demand. These pleas are called the general issue, because they amount at once to an issue, or a fact affirmed on one side, and denied on the other. Formerly the general issue was seldom pleaded, except when the party meant wholly to deny the charge alleged against him. But when he meant to distinguish, deny, or palliate the charge, it was always usual to set forth the particular facts in what is called a *special* plea; which was originally intended to apprise the court and the adverse party of the nature and circumstances of the defence, and to keep the law and

and the fact distinct. And it is an invariable rule, that every defence which cannot be thus specially pleaded, may be given in evidence, upon the general issue at the trial. Of late, on account of the chicane and delay that have attended special pleading, the courts have, in some instances, and the legislature in many more, permitted the general issue to be pleaded, thus leaving every thing open, the fact, the law, and the equity of the case, and have allowed special matter to be given in evidence at the trial.

Special pleas, in bar of the plaintiff's demand, are very various, according to the circumstances of the defendant's case. As, in real actions a general release, or a fine, both of which may destroy and bar the plaintiff's title. Or, in personal actions, an accord, arbitration, conditions performed, nonage of the defendant, or some other fact which precludes the plaintiff from his action. A *justification* is likewise a special plea in bar; as in actions of assault and battery, *son assault demesne*, that it was the plaintiff's own original assault; in trespass, that the defendant did the thing complained of in right of some office which warranted him so to do; or, in an action of slander, that the plaintiff is really as bad a man as the defendant said he was. A man may also plead the statutes of limitation in bar. (See *Statutes of LIMITATION*.) An estoppel is likewise a special plea in bar. See ESTOPPEL, BAR, and ABATEMENT.

The conditions and qualities of a plea are, 1. That it be single, and containing only one matter; for duplicity begets confusion. But by statute 4 & 5 Ann. c. 16. a man, with leave of the court, may plead two or more distinct matters or single pleas; as in an action of assault and battery, these three, not guilty, *son assault demesne*, and the statute of limitation. 2. That it be strict and positive, and not argumentative. 3. That it have convenient certainty of time, place, and persons. 4. That it answer the plaintiff's allegations in every material point. 5. That it be so pleaded as to be capable of trial. Special pleas are usually in the affirmative, sometimes in the negative, but they always advance some new fact not mentioned in the declaration; and then they must be averred to be true in the common form; "and this he is ready to verify." This is not necessary in pleas of the general issue; those always containing a denial of the facts before advanced by the other party, and therefore putting him upon the proof of them.

It is a rule in pleading that no man be allowed to plead specially such a plea as amounts only to the general issue, or a total denial of the charge; but in such case he shall be driven to plead the general issue in terms, whereby the whole question is referred to a jury. But if the defendant, in an assise or action of trespass, be desirous to refer the validity of his title to the court rather than to the jury, he may state his title specially, and at the same time *give colour* to the plaintiff, or suppose him to have an appearance or colour of title, bad indeed in point of law, but of which the jury are not competent judges. When the plea of the defendant is thus put in, if it does not amount to an issue, or total contradiction of the declaration, but only evades it, the plaintiff may plead again, and *reply* to the defendant's plea; either traversing it, that is, totally denying it; as if on an action of debt upon bond, the defendant pleads *solvit ad diem*, that he paid the money when due, here the plaintiff in his *replication* may totally traverse this plea, by denying that the defendant paid it; or he may allege new matter in contradiction to the defendant's plea; as when the defendant pleads *no award made*, the plaintiff may reply, and set forth an actual award, and assign a breach; or the replication may *confess and avoid* the plea, by some new matter or distinction, consistent with the plaintiff's former declaration; as, in an

action for trespassing upon land of which the plaintiff is seized, if the defendant shews a title to the land by descent, and that therefore he had a right to enter, and gives colour to the plaintiff, the plaintiff may either traverse and totally deny the fact of the descent; or he may confess and avoid it by replying, that true it is such descent happened, but that since the descent the defendant himself demised the lands to the plaintiff for term of life. To the replication the defendant may *rejoin*, or put in an answer called a *rejoinder*. The plaintiff may answer the rejoinder by a *sur-rejoinder*; upon which the defendant may *rebut*; and the plaintiff answer him by a *sur-rebutter*; which pleas, replications, rejoinders, sur-rejoinders, rebutters, and sur-rebutters, answer to the *exceptio, replicatio, duplicatio, triplicatio, and quadruplicatio* of the Roman laws. Inst. 4. 14. Braçt. l. 5. tr. 5. c. 1.

The whole of this process is denominated the *pleading*; in the several stages of which it must be carefully observed, not to depart or vary from the title or defence, on which the party has once insisted. For this (which is called a *departure* in pleading) might occasion endless altercation, therefore the replication must support the declaration, and the rejoinder must support the plea, without departing out of it. As in the case of pleading no award made, in consequence of a bond of arbitration, to which the plaintiff replies, setting forth an actual award; now the defendant cannot rejoin that he hath performed this award, for such rejoinder would be an entire departure from his original plea, which alleged that no such award was made; therefore he has now no other choice, but to traverse the fact of the replication, or else to demur upon the law of it. Yet in many actions the plaintiff who has alleged in his declaration a general wrong, may, in his replication, after an evasive plea by the defendant, reduce that general wrong to a more particular certainty, by assigning the injury afresh with all its specific circumstances in such manner as clearly to ascertain and identify it, consistently with his general complaint; which is called a *new or novel assignment*. Although duplicity in pleading must be avoided for various reasons, yet it is often expedient to plead in such a manner, as to avoid any implied admission of a fact, which cannot with propriety or safety be positively affirmed or denied. And this may be done by what is called a *protestation*; by which the party interposes an oblique allegation or denial of some fact, protesting (by the gerund, *protestando*) that such a matter does or does not exist; and at the same time avoiding a direct affirmation or denial. The use of this protestation is to save the party from being concluded with respect to some fact or circumstance, which cannot be directly affirmed or denied without falling into duplicity of pleading; and which yet, if he did not thus enter his protest, he might be deemed to have tacitly waived or admitted.

In any stages of the pleadings, when either side advances or affirms any new matter, he usually avers it to be true, "and this he is ready to verify;" on the other hand, when either side traverses or denies the facts pleaded by his antagonist, he usually tenders an issue, as it is called; the language of which varies with the party by whom the issue is tendered; for if the traverse or denial comes from the defendant, the issue is tendered thus, "and of this he puts himself upon the country," thereby submitting himself to the judgment of his peers; but if the traverse lies upon the plaintiff, he tenders the issue, or prays the judgment of the peers against the defendant in another form; thus, "and this he prays may be inquired of by the country." But if either side (*e. g.* the defendant) pleads a special negative plea, not traversing or denying any thing that was before alleged,

alleged, but disclosing some new negative matter; as when the suit is on a bond, conditioned to perform an award, and the defendant pleads negatively, that no award was made, he tenders no issue upon this plea; because it does not yet appear whether the fact will be disputed, the plaintiff not yet having asserted the existence of any award; but when the plaintiff replies, and sets forth an actual specific award, if then the defendant traverses the replication, and denies the making of any such award, he then, and not before, tenders an issue to the plaintiff. For when, in the course of pleading, they come to a point which is affirmed on one side, and denied on the other, they are then said to be at issue; all their debates being at last contracted into a single point, which must now be determined either in favour of the plaintiff or defendant. Blackl. Com. b. iii.

PLEA, in *Equity*, may be either to the jurisdiction, shewing that the court has no cognizance of the cause; or to the person, shewing some disability in the plaintiff, as by outlawry, excommunication, and the like; or in bar, shewing some matter, wherefore the plaintiff can demand no relief, as an act of parliament, a fine, a release, or a former decree. And the truth of this plea the defendant is bound to prove, if put upon it by the plaintiff.

PLEA to *Indictment*, is the plea of the prisoner, or defensive matter alleged by him on his arraignment, if he does not confess, or stand mute. Waiving the plea of sanctuary, which is now abrogated (see SANCTUARY); there are five pleas of this kind. 1. A plea to the jurisdiction, which is when an indictment is taken before a court that hath no cognizance of the offence; as if a man be indicted for a rape at the sheriff's tourn, or for treason at the quarter-sessions; in these, or similar cases, he may except to the jurisdiction of the court, without answering at all to the crime alleged. (2 Hal. P. C. 256.) 2. A demurrer to the indictment. (See DEMURRER.) 3. A plea in abatement, which is principally for a misnomer, a wrong name, or a false addition to the prisoner. But the prisoner derives little benefit from dilatory pleas of this kind; because, if the exception be allowed, a new bill of indictment may be framed, according to what the prisoner in his plea avers to be his true name and addition. 4. A special plea in bar, which affects the merits of the indictment, and gives a reason why the prisoner ought not to answer it at all, nor put himself upon his trial for the crime alleged. These pleas are of four kinds: a former acquittal, a former conviction, a former attainder, or a pardon. Here we may observe that, though in civil actions, in which a man may chuse what plea in bar to make, he is concluded by that plea and cannot recur to another; in criminal prosecutions, when a prisoner's plea in bar is found against him upon issue tried by a jury, or adjudged against him in point of law by the court, still he shall not be concluded or convicted thereon, but shall have judgment of *respondere oster*, and may plead over to the felony the general issue, not guilty. (2 Hal. P. C. 239.) For the law allows many pleas by which the prisoner may escape death; but only one plea, in consequence of which it can be inflicted, *viz.* on the general issue, after an impartial examination and decision of the facts, by the unanimous verdict of a jury. 5. The general issue, a plea of *not guilty*, upon which plea alone the prisoner receives his final judgment of death.

PLEA in *Bar of Execution*, may be either insanity, pregnancy, the king's pardon, an act of grace, or diversity of person, *viz.* that he is not the same that was attainted and the like. In this last case a jury shall be impanelled to try this collateral issue, *viz.* the identity of his person,

and not whether guilty or innocent: for that has been decided before. In these collateral issues, the trial shall be *instant*, and no time allowed the prisoner to make his defence, or produce his witnesses, unless he will make oath that he is not the person attainted; neither shall any peremptory challenges of the jury be allowed the prisoner, though formerly such challenges were held to be allowable, whenever a man's life was in question.

PLEAS *of the Sword*. Ranulph earl of Chester, 2 Hen. III. granted to his barons of Cheshire an ample charter of liberties, "exceptis placitis ad gladium meum pertinentibus."

The reason of the exception was, that William the Conqueror gave the earldom of Chester to his half-brother Hugh, commonly called Lupus, ancestor of this Ranulph. "Tenere ita libere ad gladium, sicut ipse rex tenuit Angliam & coronam."

Accordingly, in all indictments for felony, murder, &c. in the county palatine, the form was, "Contra pacem domini comitis, gladium & dignitatem suam;" or, "Contra dignitatem gladii Cestrie." Such were the pleas for the dignity of the earl of Chester.

PLEAS, *Court of Common*, called also common bench. See COURT of *Common Pleas*.

PLEADING, PLACITATIO, a discourse spoken at the bar, in defence of the cause of a party.

From the time of the Conquest, all pleading was performed in French till the time of Edward III., when it was appointed, that the pleas should be pleaded in English, but that they should be entered, or recorded, in Latin. But now by 4 Geo. II. cap. 26. it is enacted, that all proceedings in courts of justice shall be in English.

At Athens, and even in France and England, it was prohibited to have any formed, or prepared pleading, or to amuse the court with long artificial harangues; only, in important matters, it was the settled custom to begin the pleadings with a passage in holy scripture.

It is but of late years that eloquence was admitted to the bar, where it has been much practised and encouraged.

Among the Athenians, an equal time was allowed both parties to plead, which was measured by a water hour-glass; and in order to see justice done in this respect, there was an officer appointed to distribute the water to each, whence he was called *ephydor*.

PLEADINGS, in the strictest sense, are all the allegations of the parties to a suit, made after the count, or declaration, till issue is joined: or, more generally, *pleadings* are the mutual altercations between the plaintiff and defendant; which at present are set down and delivered into the proper office in writing, though formerly they were usually put in by their counsel *ore tenus*, or *viva voce*, in court, and then minuted down by the chief clerks, or prothonotaries; whence in our old law French, the pleadings are frequently denominated the *parol*. The first of these is the *declaration*, which see. When the plaintiff hath stated his case in the declaration, it is incumbent on the defendant within a reasonable time to make his *defence*, and put in a *plea*; or else the plaintiff will at once recover judgment by *default*, or *nihil dicit* of the defendant. (See DEFENCE.) After defence made, the defendant must put in his *plea*. But, before he defends, if the suit is commenced by *capias* or *latitat*, without any special *original*, he is entitled to demand one *imparlance*, or *licentia loquendi*; and may, before he pleads, have more granted by consent of the court; to see if he can end the matter amicably without farther suit, by talking with the plaintiff; a practice which is supposed to have arisen from a principle of religion, in obedience to the precept of the gospel (Matth. v. 25.); which

which precept has a plain reference to the Roman law of the 12 tables, which expressly directed the plaintiff and defendant to make up the matter, while they were *in the way*, or going to the prætor. There are many other previous steps which may be taken by a defendant before he puts in his plea. When these proceedings are over, the defendant must then put in his excuse or plea. For an account of the different pleas, and the further process by pleading; see PLEA, *supra*.

PLEASANT, in *Geography*, a town of Clermont county, in Ohio, containing 1245 inhabitants.—Also, in Fairfield county, containing 988 inhabitants.

PLEASANT, *Mount*. See MOUNT *Pleasant*; adding in that article after Pennsylvania, containing, in 1810, 1105 inhabitants.—Also, *Mount Pleasant* in Washington county, containing 1165; and *Mount Pleasant* in Westmoreland, containing 1780 inhabitants, both in the same state.—Also, in Jefferson county, Ohio, containing 846 inhabitants.

PLEASANT *Point*, a N.E. headland in Merry-meeting bay, Lincoln county and state of Maine.—Also, a fertile and agreeably situated point of land, on the western bank of the Passamaquoddy river, about 15 miles from the mouth of the river, and four above Moose island. On this point reside the remains of the Passamaquoddy tribe of Indians, consisting of about 400 in number, and thought to be on the decline. They have a Roman Catholic priest, and lately, a respectable meeting-house has been erected at the expence of the state. Unacquainted with agriculture, their summer employment is that of fishing, and shooting porpoises, the oil of which they extract, and sell to the Americans for the use of lamps; and in winter they occupy themselves in hunting. They have some idea of moral obligation, but are not distinguished for their honesty or fidelity. The women are graceful and delicate in their manners, and modest in their dress. The men are fullen and unfociable.—Also, the eastern boundary of Hawk's, or Sandwich river, in the harbour of Chebucto.

PLEASANT *River*, a small village, with a post-office, on the sea-coast of Washington county, in Maine, at the head of Narraguagus bay; 16 miles N.E. of Goldborough.

PLEASURE, the effect of a sensation, or perception, agreeable to the mind, or of the gratification of some appetite.

Pleasures may be distinguished into two kinds. The first, those which anticipate, or go before the reason: such are all agreeable sensations. These are popularly called *pleasures of sense*, or *of the body*.

The second are those which do not precede, or anticipate, either the senses or reason. These we call *pleasures of the mind*. Such is the joy arising from a clear perception of some future good, or the confused sensation of a present one.

For an instance of each. A man frequently finds pleasure in eating a fruit he was before unacquainted with; this is *anticipating pleasure*, which he feels before he knows the fruit to be good. On the other hand, a hungry hunter expects, or perhaps actually finds victuals; where the joy he conceives is a pleasure that follows from the knowledge of his present or future good.

*Pleasure* and *pain* seem to be no other than engines in nature's hand, by which we are directed to consult our own preservation, and avoid our ruin. To things that may contribute to the one, as food, &c. she has annexed pleasure; and to those that may conduce to the other, as hunger, diseases, &c. pain.

Among the multiplicity of things to be done, and to be avoided, for the preservation of animal life, &c. how should

we have distinguished between the one and the other, but for the sensation of pleasure or pain? These are not only spurs to urge us on, but also guides, to direct us whither we are to go. Wherever nature has fixed a pleasure, we may take it for granted, she there enjoins a duty; and something is to be there done, either for the individual, or for the species.

Hence it is, that our pleasures vary at different stages of life; the pleasures, *e. gr.* of a child, a youth, a grown man, an old man, &c. all tending to those particular things required by nature in that particular state of life, either for the preservation, simply, or, jointly, for that and propagation, &c.

Hence, from the different constitutions of the body, at different ages, it were very easy to account for all the particular tastes and pleasures thereof: not by deducing the pleasures mechanically from the disposition of the organs in that state, but by considering what is necessary for the perfection and well-being of the individual in that state, and what is to contribute to that of the species. In a child, *e. gr.* mere preservation in the present state is not enough, it must likewise grow: to bring this to pass, nature has made the returns of hunger, &c. more frequent, as well as more acute, and the pleasures of feeding more exquisite. And that the excess of aliment, in proportion to the bulk of the body, may be dispensed with, she has made one of the great pleasures of the state to consist in a series of sportive exercises; by means of which the parts of the body come to be opened and expanded, and arrive at maturity. This done, the pleasures that conduced to it disappear; and others, suited to the new state, succeed.

In the Hartleyan system, the capacity of pleasure and pain is one of the faculties of the human mind, by which a man becomes capable of action, enjoyment, or suffering. Our affections, or passions, are feelings arising from the perception of pleasure or pain, or, in other words, of natural good or evil, according to the circumstances in which they are placed. "By the affections," says Dr. Hartley, "we are excited to pursue happiness and all its means, and to flee from misery and all its apparent causes." The primary affections in his system are ten; five grateful, and five ungrateful: the former are love, desire, hope, joy, and pleasing recollection: the latter are hatred, aversion, fear, sorrow, and displeasing recollection. (See AFFECTION and PASSION.) The existence of this capacity of pleasure and pain we derive from consciousness; and what pleasure and pain are, we learn from experience; these being feelings which cannot be expressed by definition. Natural good produces pleasure, and that which produces pain is natural evil. Our pleasures and pains are either sensible or intellectual, that is, they are the effect of either sensations or ideas. The pleasurable and painful sensations he thus explains by his theory of vibrations. Moderate vibrations are the causes of pleasure, whilst violent vibrations occasion pain; hence the same sensation, which in a moderate degree is pleasurable, may, by increasing beyond certain limits, become exquisitely painful, as in the case of heat. Dr. Hartley conjectures, that the precise limit between pleasure and pain is the solution of continuity in the nerve that vibrates. Hence, Hartley and his disciples also account for the pleasure which accompanies the recovery from painful disorders, and from the recollection of past pains, dangers, and troubles. The vigorous vibrations, which occasion pain, subside by length of time within the limits of pleasure. Hence, it has been suggested, we may account, at least in part, for the existence of evil in the universe, and are able to assign a reason, why a state of probation, to beings constituted like ourselves, should be in a considerable degree a state of suffering.

ing. Pains the most exquisite and durable, it has been said, may ultimately fall within the limits of pleasure, and may be even essential to the production of the greatest good. Dr. Hartley, in the sequel of his "Treatise on Man," has shewn how, upon his system of association and vibration, our five senses, *viz.* feeling, taste, smell, sight, and hearing, produce intellectual pleasures and pains, or the different affections, which are modifications of pleasure and pain. Arranging the affections under six general classes, *viz.* imagination, emulation, self-interest, sympathy, theopathy, and the moral sense; he traces them up to the association of ideas, and deduces them either from sensible pleasures or pains, which are evidently original, or from the combination of other intellectual pleasures or pains, which are derived from sensible ones. The pleasures and pains of imagination arise from the perception of natural or artificial beauty or deformity; and these he distinguishes into seven kinds. The pleasures and pains of ambition arise from the opinions of others concerning us; the sense of honour and of shame. Those of self-interest arise from the possession or want of the means of happiness, and security from a subjection to the hazards of misery. (See SELF-INTEREST.) For the pleasures and pains of sympathy, theopathy, and the moral sense, see these several articles. See also *Mental PHILOSOPHY*.

*PLEASURE Boat*, among the *Ancients*. See *THALAMEGUS*.

*PLEASURE Garden*, in *Ornamental Gardening*, is that sort of garden which is formed near to, or that surrounds a country-house or residence; and which is contrived for the purpose of curiosity, ornament, or entertainment. This sometimes comprehends the whole pleasure ground, but at other times is totally distinct from it. Pleasure gardens should constantly be laid out according to the nature and situation of the particular places where they are to be formed, being of greater or less extent as circumstances may direct. They are mostly planted either wholly or in the greatest part with flowers and shrubs of the more beautiful and ornamental kinds, that they may afford as much beauty and variety as possible. In their forms they may be square, oblong, or somewhat circular, and have the boundaries of the divisions formed by the arrangements of curious shrubberies, embellished with collections of the most rare, beautiful, and curious flowering shrubs; the interior parts being divided into many narrow compartments, either in the parterre method with straight beds and borders, or into plain four-foot wide beds arranging parallel, with two-foot wide alleys between each, walks being carried all round next to the outer boundaries, after which borders surrounding the whole divisions, and within these the different divided parts for the beds, as already noticed, which should in general be raised in a gently rounding manner, the edges being set with dwarf-box, thurst, and pinks by way of variety, and the alleys and walks laid with the best and finest gravel.

In these divisions may be planted the most curious and valuable hyacinths, tulips, polyanthos-narcissuses, jonquils, ranunculuses, anemones, as well as most other sorts of rare, hardy, bulbous, and tuberous-rooted flowers, each kind mostly in a separate manner, especially of those of the more choice sorts, as being necessary, not only for the sake of distinction, but for the convenience of occasionally giving them protection from severe and inclement weather. In these situations, there may likewise be put out curious collections of the finest descriptions of fibrous-rooted flowering plants, such as carnations, polyanthuses, auriculas, and many other kinds, some of which being placed in separate beds, as those of the more valuable sorts, and others dispersed in different compartments, in order to give the

greatest possible degrees of variety. Still further, in other compartments, there may be exhibitions containing great varieties of all the different kinds of both the bulbous and fibrous-rooted sorts of flowering plants.

Gardens of this kind should constantly, in every part, be kept clean, neat, and perfectly in order.

*PLEASURE Ground*, in *Gardening*, any sort of ornamented ground round a residence. It comprehends all the ornamental compartments or divisions of ground and plantation; such as lawns, plantations of trees and shrubs, flower compartments, walks, pieces of water, &c. whether situated wholly within the space generally considered as pleasure ground, or extended over ha-has, or by other communications, to the adjacent fields, parks, paddocks, or out grounds.

In designs for pleasure grounds, modern improvements reject all formal works, such as long straight walks, regular interfections, square grass plots, corresponding parterres, quadrangular and angular spaces, inclosed with high clipped hedges, &c., as well as all other uniformities; instead of which, open spaces of grass ground of varied forms and dimensions, and winding walks, all bounded with plantations of trees, shrubs, and flowers, in various clumps and other distributions, are exhibited in a variety of imitative rural forms, as curves, projections, openings, and closings, in imitation of a natural assemblage, having all the various plantations open to the walks and lawns. A spacious open lawn of grass ground being generally first exhibited immediately in the front of the mansion, or main habitation, sometimes widely extended in open space on both sides to admit of greater prospect, &c., and sometimes more contracted towards the habitation, widening gradually outward, and having each side embellished with plantations of shrubbery, groves, thickets, &c., in clumps, and other parts, in sweeps, curves, and projections, towards the lawn, &c., with breaks or openings of grass spaces at intervals, between the plantations; and serpentine gravel walks winding under the shade of the trees; extended plantations being also carried round next the outer boundary of the ground, in various openings and closings, having also gravel walks winding through them, for shady and private walking; and in the interior divisions of the ground serpentine winding walks exhibited, and elegant grass openings, arranging various ways, all bordered with shrubberies, and other tree and shrub plantations, flower compartments, &c., disposed in a variety of different rural forms and dimensions, in easy bendings, concaves, projections, and straight ranges, occasionally; with intervening breaks or openings of grass ground between the compartments of plantations, &c., both to promote rural diversity, and for communication and prospect to the different divisions; all the plantations being so variously arranged, as gradually to discover new scenes, each furnishing fresh variety, both in the form of the design in different parts, as well as in the disposition of the various trees, shrubs, and flowers, and other ornaments and diversities.

So that in these designs, according to modern gardening, a tract of ground of any extent may have the prospect varied and diversified exceedingly, in a beautiful representation of art and nature, so that in passing from one compartment to another, new varieties present themselves in the most agreeable manner; and even if the figure of the ground be irregular, and its surface has many inequalities, in risings and fallings, and other irregularities, the whole may be improved without any great trouble of squaring and levelling, as by humouring the natural form, even the very irregularities may be made to conceal their natural deformities, and carry along with them an air of diversity and novelty.

In these rural works, however, we should not entirely abolish all appearance of art and uniformity; for these, when properly applied, give an additional beauty and peculiar grace to all natural productions, and set nature in the fairest and most advantageous point of view. One principal point in laying out a pleasure ground, is for the designer to take particular care that the whole extent of his ground be not taken in at one view, as where the contrary is the case, there is a tameness and want of proper effect produced.

It is impossible to give any directions for planting a pleasure ground; as the plan may be varied exceedingly, according to the natural figure, position, and situation of the land, and taste of the designer.

In respect to the situation, it must be immediately contiguous to the main house, whether high or low situated: however, a somewhat elevated situation, or the side or summit of some moderate rising ground, is always the most eligible on which to erect the chief habitation, arranging the pleasure ground accordingly; such an exposure being the most desirable, both for the beauty of the prospect and healthfulness of the air; a low level situation neither affording a due prospect of the ground, nor the adjacent country, besides being liable to unwholesome dampness, and sometimes inundation in winter: there are, however, many level situations, forming plains or flats, that possess great advantages both of soil and prospect, and the beauties of water without too much moisture; there are also sometimes large tracts of ground, consisting both of low and high situations, as level plains, hollows, eminences, declivities, and other inequalities, which may be so improved as to make a most desirable pleasure ground, as the scene may be varied in the most beautiful manner imaginable; but as the choice of situation and scope of ground is not always attainable, every one must regulate his plan in the most commodious manner possible, agreeable to the nature of the particular situation, extent of ground, and plan which has been adopted.

The extent of pleasure grounds may be varied, according to that of the estate or premises, and other circumstances, as from a quarter or half an acre to thirty or forty or more.

The ground for this purpose should previously be well fenced in, by a wall, paling, hedge, or parts of each sort, and in some parts a fosse or haia, where it may be necessary to extend the prospect, either at the termination of a lawn, walk, or avenue; and the close fences should generally be concealed within, particularly the wall and paling fences, by a range of close plantation, unless where the wall may be wanted for the culture of wall fruit. But sometimes, when the pleasure ground adjoins to a fine park, paddock, or other agreeable prospect, the boundary fence on that side is often either a low edge, or a haia; but many prefer the latter, especially at the termination of any spacious opening, both to extend the prospect more effectually, and give the ground an air of greater extent, than it really has, at a distance; the haia being sunk, nothing like a fence appears, so that the adjacent park, fields, &c. appear to be connected with the grounds.

The arrangement of the several divisions, both internal and external, must be wholly regulated by the nature and extent of the ground.

And in whatsoever mode such grounds are laid out, the whole of the different quarters, walks, and other parts, should be kept in an exact and neat order.

According to Mr. Loudon, the pleasure ground may consist of scenes of different expressions of avowed art, as those of gardening; and of nature, as those of picturesque

improvement, such as tranquil or sequestered glades, romantic glens, flowery meads, furzy heaths, tangled dingles, wooded dells, rocky steeps, and numberless others, which are to be met with in a varied or picturesque country, and are either to be heightened in effect, or preserved from cultivation by the improver. Wherever the pleasure ground is not under some of the particular scenes of ornamental gardening, it should be fed at least by sheep, and often by horses, cattle, &c., which should be allowed to come close to the terrace wall that separates the lawn from the mansion; for what can be more dull and unnatural, than the modern method of surrounding a house by a naked lawn totally destitute of animation?

A hollow winding dell or dingle, containing a brook or rill overhung with wood, and its banks diversified by broken ground presenting various coloured earths, and among the low growths old trunks of trees, roots, and stones, or dells of a grander character, containing bold, perpendicular, projecting, or irregular, massive rocks, overhung with huge trees, bushes, ferns, and creepers, grouped and combined in an infinite diversity of ways,—the stream, interrupted by the rocks, tumbling over in roaring cataracts, foaming cascades, or interrupted only by gentle falls,—and perhaps in some places, where the dell widens into a valley, spreading itself into a crystal lake, varied by little islands and woody projections, all heightened by the usual appendages of animation, the singing of birds, the fragrance of flowers, from what is considered to be among the most enchanting kinds of reclusive pleasure ground scenery. When a place is fortunate enough to have such a romantic chain of picturesque beauty as this, it should seldom be touched by the hand of art. It may happen, that some improvement may be made, by shewing, in a partial manner, rocks, roots, or stones, that are perhaps totally concealed; by augmenting a natural cascade, or by supplying ivy, or some other creepers, or evergreens, &c.; but in general little more can be attempted with propriety. The principal operation, that in any case can be undertaken in such a scene, is, where it may be requisite to lead through a walk, or road, either to observe its beauties, or as an approach to some other part of the residence. The difficulty of executing either of these will be great to those, who think of nothing but undulating sweeps, shaven lawns, and serpentine gravel walks; but by those accustomed to admire this kind of scenery, the operation will easily be accomplished. See RESIDENCE.

PLEASURE of the King, in *Law*, is used in connection with the infliction of punishment for any crime, not to signify any extrajudicial will of the sovereign, but such as is declared by his representatives, the judges in his courts of justice: “voluntas regis in curia, non in camera.” 1 Hal. P. C. 375.

PLEAU, LA, in *Geography*, a town of France, in the department of the Correze, and chief place of a canton, in the district of Tulle; 18 miles E. of Tulle. The place contains 655, and the canton 6355 inhabitants, on a territory of 232½ kilometers, in 8 communes.

PLEAUX, a town of France, in the department of the Cantal, and chief place of a canton, in the district of Mauriac; 8 miles S.W. of Mauriac. The place contains 2584, and the canton 10,667 inhabitants, on a territory of 182½ kilometres, in 12 communes.

PLEBANUS was anciently the title of a rural dean.

The denomination arose hence, that these deaneries were then affixed to the *plebania*, or chief mother-church within such a district; which, at first, was usually ten parishes.

PLEBANUS seems also to have been used for a parish-priest of such a large mother-church, as was exempt from the jurisdiction of the ordinary; so that he had the authority of

a rural dean committed to him by the archbishop; to whom the church was immediately subject.

**PLEBEIAN, PLEBEIUS**, a person of the rank of the populace, or common people.

The term is chiefly used in speaking of the ancient Romans; who were divided, about the time of Tarquin's expulsion, into senators, knights, and plebeians, or commons.

The plebeians were those who could not claim their descent from the ancient senators, appointed by Romulus, and the kings who succeeded him.

**PLEBEIAN Games**, were games celebrated by the Roman people, in remembrance, as some say, of their reconciliation with the senators, after the expulsion from the city, in the year of Rome 261; or, according to others, in token of their public rejoicing, when the kings were driven from Rome, A.U.C. 245, and the people enjoyed their liberty. These games were celebrated in the circus for three days, and commenced on the seventh of the calends of December. Adrian instituted plebeian games in the circus, A.U.C. 874.

**PLEBISCITUM**, among the Romans, a law enacted by the common people, at the request of the tribune, or some other plebeian magistrate, without the intervention of the senate.

**PLEBISCITUM** is more particularly applied to the law which the people made, when, upon some misunderstanding with the senate, they retired to the Aventine mount.

**PLECH**, in *Geography*, a town of Germany, in the principality of Culmbach; 21 miles S. of Pegnitz.

**PLECHAS**, a word used by Hippocrates to express that region of the body which is terminated backward by the anus, forward by the pudenda, and sideways by the hips.

**PLECTANÆ**, a word used by some to express the cornua uteri, and by others, for any plexus of vessels.

**PLECTRANTHUS**, in *Botany*, received that name from L'Heritier, in allusion to the *spur*, *πλεκίσιον*, of the corolla, which he conceived to be an essential part of the generic character.—L'Herit. Stirp. 85. Schreb. 396. Willd. Sp. Pl. v. 3. 168. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 3. 425. Brown Prodr. Nov. Holl. v. 1. 505. (Germanca; Juss. 116. Lamarek Illustr. t. 514.)—Class and order, *Didymia Gymnospermia*. Nat. Ord. *Verticillata*, Linn. *Labiata*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, somewhat bell-shaped, short, two-lipped; upper lip ovate, broadest, ascending; lower four-cleft, acute, the two lower segments rather the longest. *Cor.* of one petal, ringent, reversed; tube compressed, longer than the calyx: one lip, which is turned uppermost, broadest, three-cleft; its middle segment very large, emarginate; lateral ones small: the other, directed downwards, narrower, entire, ovate, concave. Nectary a spur or prominence, from the base of the tube of the corolla, pointing upwards. *Stam.* Filaments four, declining, awl-shaped, two of them rather the shortest; anthers simple. *Pist.* Germen four-lobed; style thread-shaped, the length and position of the stamens; stigma cloven, acute. *Peric.* none, the calyx containing the four roundish seeds.

Ess. Ch. Upper lip of the calyx largest; lower four-cleft. Corolla reversed, ringent, its tube spurred on the upper side. Stamens simple.

Such are the characters of this genus, as originally defined by its author, who considered the reversed corolla, or flower; the spur or prominence of the tube; and the simple stamens; as essential marks. The two latter especially were supposed to distinguish it from *Ocimum*; see that ar-

ticle. Mr. Brown however, looking more deeply into this latter genus, and finding several of its species without any tooth or appendage to their filaments, has referred such to *Plectranthus*, waving the consideration of the spur. He therefore gives the following character of *Plectranthus*.

Calyx two-lipped, striated, the lower lip divided; the base tumid beneath when in fruit. Upper lip of the corolla three-cleft, the middle segment two-lobed; lower lip longer, undivided, (mostly concave.) Stamens declining; their filaments without teeth, (sometimes united at the base;) anthers of one cell, beardless.

This includes, not only the *Plectranthus* of other authors, and the toothless species of *Ocimum*, but also the *Dentidia* and *Coleus* of Loureiro. Mr. Brown does not admit *Lavandula carnosa* into this genus, from which he says it differs in calyx and inflorescence, though agreeing in corolla, stamens and stigma, constituting, in his opinion, a genus by itself. (See *LAVANDULA*, at the end.) All the six New-Holland species of Mr. Brown's *Plectranthus* are destitute of a spur. As the question is rather doubtful, while the whole genus of *Ocimum* requires to be critically examined, we shall here exhibit only such species of the genus before us as we conceive to answer to its original idea.

1. *P. fruticosus*. Shrubby *Plectranthus*. L'Herit. Stirp. 85. t. 41. Willd. n. 1. Ait. n. 1. (Germanca *urticifolia*; Lamarek Dict. v. 2. 690.)—Nectary spurred. Clusters compound. Flower-stalks three-cleft. Stem shrubby, downy.—Found at the Cape of Good Hope, from whence Mr. Maillon sent it in 1774 to Kew. This is a greenhouse shrub, flowering copiously from June to September. Every part has a fragrant scent. The stem is clothed with fine short down, unspotted. Leaves opposite, stalked, ovate, strongly ferrated like those of a common nettle, veiny, roughish. Flowers copious, in pale violet clusters.

2. *P. galvatus*. Helmet *Plectranthus*. Vahl. Symb. v. 1. 43. Willd. n. 2.—Nectary gibbous. Partial flower-stalks branched. Leaves ovate, somewhat heart-shaped, pointed, ferrated.—Native of Java. Stem villous, furrowed. Leaves stalked, broadly ovate, villous, especially the veins beneath. Cluster terminal; the flower-stalks opposite, branched, without bractæas. Corolla downy; its lower lip hooded.

3. *P. nudiflorus*. Naked-flowered *Plectranthus*. Willd. n. 3.—Nectary gibbous. Panicle racemose, naked. Leaves heart-shaped, rugged; the upper ones clasping the stem.—Supposed to be a native of China; Willdenow having seen it in gardens under the name of *Ocimum chinense*. Root perennial. Stem erect, square, downy, scarcely six inches high. Lower leaves stalked, two or three inches long, coarsely toothed, rugose, smooth, except the veins at the back. Panicle a foot or more in length; each whorl of four clusters an inch long, turned one way, with two small heart-shaped bractæas. Corolla small, closed, downy.

4. *P. Forskoliai*. Bearded *Plectranthus*. Vahl. Symb. v. 1. 44. Willd. n. 4. Ait. n. 2. (*P. barbatus*; Andr. Repof. t. 594.)—Nectary gibbous. Clusters naked. Stem even, quadrangular.—Native of Arabia. *Forskäll*. Commerson gathered it in Madagascar and the Mauritius, and lord Valentia sent it to England in 1806. The whole herb is downy. Root tuberous, increasing prodigiously in its native soil. Leaves ovate, crenate, bluntish, stalked. Flowers in a long, whorled, upright cluster, pendulous, pale purple, hairy externally.

5. *P. crassifolius*. Thick-leaved *Plectranthus*. Vahl. Symb. v. 1. 44. Willd. n. 5.—Nectary gibbous. Clusters bracteated. Leaves ovate, fleshy.—Native of Egypt. Differs

Differs from the last, according to Vahl, in its fleshy leaves, and in having ovate membranous bractæas.

6. *P. punctatus*. Dotted Plectranthus. L'Herit. Stirp. 87. t. 42; not 41. Willd. n. 6. Ait. n. 3. (*Ocymum punctatum*; Linn. Suppl. 275.)—Nectary gibbous. Clusters dense. Stem herbaceous, tumid, hairy.—Native of Africa, where it is said to have been found by Mr. Bruce the famous traveller. This species is biennial, flowering in the greenhouse from January to May. The tumid, fleshy, purple-dotted, hairy stem distinguishes it. The footstalks are short. Corolla very pale blue.

7. *P. carnosus*. Dense-spiked Plectranthus. (*Lavandula carnosa*; Linn. fil. Diff. 9. t. 2. Am. Acad. v. 10. 52. t. 3. Ait. Hort. Kew. v. 3. 383. Katur-Kurka; Rheede Hort. Malab. v. 10. 179. t. 90. *Nepeta indica*, rotundior folio; Morif. Sect. 11. t. 6. f. 7.)—Nectary gibbous. Spikes ovate, dense. Leaves ovate, somewhat heart-shaped, fleshy, wavy or ferrated.—Found by Koenig, on dry walls and rocks, at Sadras in the East Indies, flowering in the hottest season, after which the foliage appears. The stem is shrubby, but succulent, finely hoary. Leaves stalked, ovate or slightly heart-shaped, wavy, or more or less deeply ferrated, very fleshy, minutely hoary, varying greatly in size. Spikes generally three or four to each branch, stalked, solitary and simple, ovate, thick, very much crowded, the calyces singularly reflexed, or imbricated downward. Corolla yellowish. Rheede speaks of this plant as aromatic, and useful against the bite of some serpents. It was sent to Kew in 1788 by Sir Joseph Banks, and is kept in the stove, flowering in June and July; but the root is said to be only biennial.

PLECTRONIA, so named by Linnæus, from *πλεκτρον*, a cock's spur, which its thorns very much resemble.—Linn. Mant. 6. Schreb. 153. Willd. Sp. Pl. v. 1. 1152. Mart. Mill. Dict. v. 3. Juss. 382. Lamarck Illustr. t. 146.—Class and order, *Pentandria Monogynia*. Nat. Ord. akin to *Rhamnii*, Juss. Linnæus refers it to his *Consorte*, in his Prælectiones in Ord. Nat. 408.

Gen. Ch. Cal. Perianth superior, of one leaf, turbinate, with five slight teeth, the mouth closed with five hairy scales, permanent. Cor. Petals five, lanceolate, sessile, inserted into the mouth of the calyx. Stam. Filaments five, very short; anthers two-lobed, roundish, each sheltered by one of the scales of the calyx. Pist. Germen inferior; style thread-shaped, shorter than the calyx; stigma ovate. Peric. Berry oblong, of two cells. Seeds solitary, oblong, compressed.

Ess. Ch. Petals five, inserted into the mouth of the calyx, which is closed by five hairy scales. Berry inferior, with two seeds.

1. *P. ventosa*. Linn. Mant. 52. (*P. corymbosa*; Burm. Prodr. Cap. 6. *Rhamnus foliis subrotundo-acuminatis, fructu racemoso*; Burm. Afr. 257. t. 94.)—Native of woods at the Cape of Good Hope, flowering in September; a stranger, as yet, in our gardens. This is a tree, whose trunk and principal branches are armed with very considerable, long, tapering, simple, opposite spines. The leaves are opposite, stalked, elliptical, acute at each end, entire thick-edged, somewhat wavy and revolute, smooth on both sides; polished above; paler and opaque beneath; with one rib, and many transverse veins. Flowers small, yellow, in compound, axillary, dense clusters, about twice the length of each footstalk; their stalks opposite, angular, rather downy, with opposite, minute, deciduous bractæas under their subdivisions.

We are at a loss for the meaning of the specific name given by Linnæus, which is not so good as Burmann's.

The tree is said to be well calculated for making hedges. The habit and appearance of every part seem rather to justify the opinion of Linnæus than of Jussieu, respecting the natural order to which this plant belongs, but the inferior germen, if it be really so, is adverse to both.

PLECTRONITÆ. See CONICTHYODONTES.

PLECTRUM, a word used by some anatomical writers to express the styloid process of the os petrosum; by others for the uvula; and by others for the tongue.

PLECTRUM, *πλεκτρον*, a machine of wood or ivory used by the ancients in playing upon the lyre, crooked and pointed at both ends, in using which there was more spirit given to the tone, and less danger of hitting the wrong string than by using the finger. The quill used in playing on the mandoline, is in miniature what we may suppose the plectrum to have been with respect to the lyre.

PLEDGE, in Law. See VADTUM.

PLEDGE. See PROCESS.

PLEDGE, *Plegius*, a surety, or gage, either real or personal, which the plaintiff, or demandant, is to find, for his prosecuting the suit.

The word is sometimes also used for frank pledge.

To PLEDGE, in Drinking, denotes to warrant, or be surety to one, that he shall receive no harm while he is taking his draught.

The phrase is referred, by our antiquaries, to the practice of the Danes, heretofore, in England; who frequently used to stab, or cut the throats of the natives while they were drinking.

PLEDGERY, or PLEGGERY, suretyship, or an undertaking, or answering for another.

The appellant shall require the constable and marshal to deliver his pleggs, and to discharge them of their pledgery; and the constable and marshal shall ask leave of the king to acquit his pleggs, after that the appellant is come into the lists to do his devoir. Orig. Jur. ex Vet. Cod. MS. in Bibl. Selden.

PLEDGES of Goods for Money, &c. See PAWN and BAILMENT.

PLEDGET, in Surgery, a kind of flat tent, made not to enter a wound, but to be laid upon it, to imbibe the superfluous humours, and keep it clean and dry.

PLEEA, in Botany, a name of Michaux's, which seems intended to express the superabundance of stamens compared with others of its kindred, from *πλεον*, more. Mich. Boreal. Amer. v. 1. 247. Pursh Am. Sept. v. 1. 275.—Class and order, *Enneandria Trigynia*. Nat. Ord. *Tripetaloidæ*, Linn. Junci, Juss.

Gen. Ch. Cal. Sheath of one leaf. Cor. of one petal, divided to the base into six spreading, nearly equal, linear-lanceolate, acute segments, permanent. Stam. Filaments nine, awl-shaped, shorter than the corolla, inserted into the base of its segments; anthers oblong, versatile, of two cells, opening lengthwise. Pist. Germen superior, oblong, triangular; styles none; stigmas three, sessile, linear, obtuse. Peric. Capsule covered by the permanent closed corolla, roundish-triangular, of three cells, without any manifest partitions, except the inflexed margins of the valves, the cells bursting longitudinally at their inner edge, the valves splitting at the top. Seeds numerous, oblong, cylindrical, slightly curved, inserted into the margins of the valves, each by a short stalk.

Ess. Ch. Corolla in six deep spreading segments. Capsule triangular, of three cells. Seeds numerous, oblong, inserted into the margins of the valves. Sheaths simple, single-flowered.

1. *P. tenuifolia*. Michaux Boreal. Amer. v. 1. 248. t. 25. Pursh

Pursh v. 1. 278.—The only species; a native of open wet woods in Lower Carolina. *Michaux.* The root is perennial, resembling that of an *Iris*. Leaves few, radical, sheathing at the base, erect, very narrow, smooth, flattened, taper-pointed, about half as tall as the common flower-stalk, which is radical, about a foot and half high, simple, erect, round, smooth, nearly naked. Cluster terminal, erect, simple, of six or eight yellowish-brown stalked flowers, the size of *Ornithogalum umbellatum*, each accompanied by a tubular pointed sheath as long as the flower of its stalk. This plant agrees in number of stamens, though not of pistils, with our *Butomus umbellatus*, a genus of the same natural order, but the structure of the seeds, and their insertion, are both different, as well as the inflorescence.

PLEGII de Retorno, &c. in *Lacv.* See REPLEVY and RETORNO Habendo.

PLEGIIS ACQUETANDIS, a writ that lies for a surety, against him for whom he is surety, in case he pay not the money at the day. Fitz. Nat. Brev.

PLEGORRHIZA, in *Botany*, from  $\pi\lambda\eta\rho\zeta$ , a wound, and  $\rho\iota\zeta$ , a root, because the root of this plant is used by the inhabitants of Chili as a vulnerary. Molin. Chil., the German edition, 140. Willd. Sp. Pl. v. 2. 487. Juss. 438.—Class and order, *Enneandria Monogynia*.

Eff. Ch. Calyx none. Corolla of one petal. Capsule of one cell. Seed solitary.

1. P. *adstringens*. Willd. n. 1. (P. Guajecuru; Molina as above.)—Native of the northern provinces of Chili. Stem woody. Radical leaves collected into a tuft, stalked, oval, simple, undivided; those on the branches sessile, ovate. Flowers numerous, stalked, terminal. Corolla undivided. Stamens nine, very short. Anthers oblong. Germen orbicular. Style cylindrical, the length of the stamens. Stigma simple. Capsule oblong, rather compressed. Seed of the same shape. Jussieu reckons a calyx, what Willdenow, as above, terms corolla, and advises that the genus should be compared with his orders of *Lauri* and *Polygonæ*.

PLEGRA, in *Ancient Geography*, a town of Asia, in the interior of Galatia, in the country of the Paphlagonians: placed by Ptolemy between Zagira and Sacora.

PLEIADES, Πλειάδες, in *Astronomy*, an assemblage of seven stars in the neck of the constellation Taurus.

They are thus called from the Greek  $\pi\lambda\epsilon\upsilon$ , *navigare*, to sail; as being terrible to mariners, on account of the rains and storms that frequently rise with them.

The Latins call them *vergilie*, from *ver*, *spring*; because of their rising about the vernal equinox.

The largest is of the third magnitude, and is called *Lucida Pleiadum*. See TAURUS.

There are now only six stars visible in Pleiades, and this appears to have been the case so long ago as the time of Ovid:

“Quæ septem dici, sex tamen esse solent.”

PLEIADES, in *Mythology*, were the seven daughters of Atlas, called Maya, Electra, Taygeta, Asteropa, Alcione, Celeno, and Merope. These Atlantides, it is said, were translated to the heavens, and formed the Pleiades; the meaning of which fable is, that Atlas first observed these stars, and called them by the names of his daughters.

PLEIADES, *Poetical*, is a name which the Greeks gave to seven celebrated poets, flourishing under the reign of Ptolemy Philadelphus.

In imitation of the Greeks, Ronfard formed a Pleiades of French poets under the reign of Henry II. It consisted of Daurat, Ronfard, du Bellay, Belleau, Baif, Tyard, and Jodelle.

On the same model, some of their authors afterwards projected a new Pleiades of the Latin poets of the last century; but they were not agreed about the names of those that should compose it; much less on him who should be the Lucida Pleiadum. M. Baillet named F. Rapin, F. Commire, F. de la Rue, M. de Santeuil, M. Menage, M. du Perier, and M. Petit.

PLEIN RIVER, in *Geography*, the northern head-water of Illinois river; it interlocks with Chicago river, a water of lake Michigan, and five miles below Dupage lake, through which it passes; it joins Theakiki river, which comes from the eastward. Thence the united stream takes the name of Illinois. The land between these branches is rich, and intermixed with swamps and ponds.

PLEINFELD, or BLEINFELD, a town of Bavaria, insulated in Anspach; 22 miles S.E. of Anspach. N. lat. 49° 3'. E. long. 10° 55'.

PLEINEFOUGE/RES, a town of France, in the department of the Ille and Villaine, and chief place of a canton, in the district of St. Malo. The town contains 2726, and the canton 12,878 inhabitants, on a territory of 167½ kilometres, in 11 communes.

PLEINTING, a town of Bavaria, on the Danube; 5 miles S.S.E. of Osterhof.

PLEISKE, a river of Brandenburg, which runs into the Oder; 9 miles above Francfort.

PLEISNITZ, a town of Hungary, 25 miles W. of Caschau.

PLEISSA, a river of Saxony, which runs into the Elster, near Leipzig.

PLEISSEN, or PLEISSA, a lordship of Germany, in the principality of Hesse Rhinfels, insulated in the duchy of Brunswick. It takes its name from an old castle situated on a mountain.

PLEISVEDEL, a town of Bohemia, in the circle of Leitmeritz; 8 miles S.W. of Leypa.

PLE/LAN, a town of France, in the department of the Ille and Villaine, and chief place of a canton, in the district of Montfort; six posts E.N.E. of Vannes. The place contains 2917, and the canton 13,316 inhabitants, on a territory of 325 kilometres, in 8 communes.—Also, a town of France, in the department of the Northern Coasts, and chief place of a canton, in the district of Dinan; 6 miles E. of Loudeac. The place contains 854, and the canton 3903 inhabitants, on a territory of 122½ kilometres, in 9 communes.

PLEMMYRIUM, in *Ancient Geography*, a promontory on the eastern coast of Sicily, over-against Syracuse, of which it was the port, according to Thucydides. It is also mentioned by Virgil.

PLEMMYRÓS, a word used by the old Greek writers to express a redundancy of humours. Its proper signification is the flowing in of the tide.

PLEMPIUS, VOPISCUS FORTUNATUS, in *Biography*, an eminent physician, was born at Amsterdam, of a distinguished family, in December 1601. He received his classical education at Gand, and studied philosophy at Louvain, whence he repaired to Leyden, and commenced his medical studies. He subsequently travelled into Italy, and passed the principal portion of his time at Padua and Bologna, having the advantage of pursuing his anatomical investigations under the direction of Spigelius at the former place, and of taking his degree of doctor at the latter. On his return to Holland, he settled in the practice of his profession in his native city, where he acquired a high reputation; and was induced to accept the invitation of Isabella, princess of the Low Countries, to the vacant professorship of

of the Institutes of Medicine, at Louvain, of which he took possession in 1633. At the same time he abjured the Protestant faith, became a Catholic, and took a new degree of doctor, in conformity with the rules of the university. In the following year, however, he quitted this chair, for the professorship of pathology. He was soon afterwards nominated principal of the college of Breugel. He died at Louvain in December 1671, aged seventy.

Plempius increased the reputation of Louvain by the extent of his attainments, and was an able controversialist, distinguishing himself in all the public questions that came under discussion. He left the following works. "A Treatise on the Muscles," in Dutch. "Ophthalmographia, five de Oculi Fabricâ, Actione, et Ufu," Amst. 1632; Lovæn. 1648. A translation of the Anatomy of Cabrolus into Dutch, with notes; Amst. 1633. "Fundamenta, seu Institutiones Medicinæ;" Lov. 1638, 1644, &c. In the first edition of this work, Plempius doubted the circulation of the blood; but in the second, he was a strenuous advocate for that doctrine. "Animadversiones in veram Praxim curandæ Tertianæ propositam à Doctore Petro Barba;" *ibid.* 1642. "Antimus Coningius Peruviani pulveris defensor, repulsus à Melippo Protymo;" *ibid.* 1655. Coningius is the assumed name of Honoratus Fabri; Protymus was that assumed by Plempius in order to decry the use of cinchona. "Avicennæ Canonis Liber primus et secundus ex Arabica Lingua in Latinam translatus;" *ibid.* 1658. "Tractatus de Affectuum Pilorum et Unguium;" *ibid.* 1662. "De Togatorum Valetudine tuendâ Commentarius;" Brux. 1670. The two following are generally ascribed to this author, though Mangetus and Lipenius (probably misinterpreting the initial) ascribe them to Francis Plempius; *viz.* "Munitio Fundamentorum Medicinæ V. F. Plempii adversus Jacobum Primerosium;" Amst. 1659. "Loimographia, five, Tractatus de Peste;" *ibid.* 1664. Eloy Dict. Hist. de la Medecine.

PLENARTY, in *Law*, a term used in ecclesiastical matters, to denote that a benefice is full, or possessed of an incumbent.

In which sense it stands opposed to *vacancy*.

Institution, by six months, is a good plenarty against a common person, but not against the king, without induction. See INSTITUTION and INDUCTION.

PLENARY, formed of the Latin *plenarius*, of *plenus*, full, something complete, or full. Thus we say, the pope grants plenary indulgences, *i. e.* full and entire remissions of the penalties due to all sins.

PLENE ADMINISTRAVIT, in *Law*, is a plea pleaded by an executor or administrator, where they have administered the deceased's estate faithfully and justly before the action brought against them. On *plene administravit*, pleaded by an executor, if it be proved that he hath goods in his hands which were the testator's, he may give in evidence, that he hath paid to the value of his own money, and need not plead it specially; for when an executor before the action hath paid the money in equal degree with that demanded by the plaintiff, he may plead fully administered generally, and give the special matter in evidence. 2 Lill. Abr. 330.

PLENEUF, in *Geography*, a town of France, in the department of the North Coasts, and chief place of a canton, in the district of St. Brieuc; 20 miles W.N.W. of Dinan. The place contains 1243, and the canton 6502 inhabitants, on a territory of 115 kilometres, in 5 communes.

PLENILUNIUM, compounded of *plenus*, and *luna*, in *Astronomy*, that phasis or state of the moon, properly called the full moon.

PLENIPOTENTIARY, compounded of *plenus*, full, and *potentia*, power, a person who has full power and commission to do any thing.

The word is chiefly understood of the ministers or ambassadors sent from princes or states to treat of peace, marriages, and other important matters.

The first thing done in conferences of peace, is, to examine the power of the plenipotentiaries. See TREATY.

PLENITUDE, PLENITUDO, the quality of a thing that is full, or that fills another.

In physics, it is chiefly used for a redundancy of blood and humours.

Physicians reckon two kinds of plenitude. The one called *ad vires*, when the abundance of the blood oppresses the patient's strength.

The other *ad vasa*, when it fills the vessels too much; swelling them to a degree of bursting.

PLENNA, a word used by some writers to express any mucous humour.

PLENUM, in *Physics*, a term used to signify that state of things, in which every part of space, or extension, is supposed to be full of matter. It is used in opposition to a *vacuum*, which is a space supposed devoid of all matter.

The Cartesians adhere firmly to the doctrine of an absolute plenum. This they do on this principle, that the essence of matter consists in extension; and hence, indeed, the consequence is very easy, that wherever there is space or extension, there is also matter. But this principle we have elsewhere shewn to be false; and, therefore, the consequence drawn from it falls to the ground. See MATTER.

That there is a real vacuum, in the nature of things, is likewise demonstrated by arguments *à posteriori*, under VACUUM.

PLEONASM, PLEONASMUS, formed from *πλεονασμος*, *q. d.* superabundancy, in *Rhetoric*, a figure of speech, by which we make use of words, seemingly needless or superfluous, in order to express a thought with the greater force and energy.

Such is, *I saw it with my own eyes; or, he heard it with his own ears, &c.*

The pleonasm is called by the Latins *redundantia*.

Pleonasm, by grammarians, is usually defined a fault in discourse, wherein we say more than is necessary.

M. Vaugelas will not allow the phrase, *I saw it with my own eyes*, to be a pleonasm; inasmuch as there are no superfluous words in it; none but what are necessary to give a stronger assurance of the thing affirmed. It is sufficient that one of the phrases say somewhat more than the other, to avoid the imputation of a pleonasm.

In effect, though we give the name pleonasm to any thing that is not necessary, or that enters the discourse independently of the sense or construction, yet there are frequently words which, in that view, would be pertinent, and even are used to good purpose, to give a greater force or grace to discourse, and to ascertain the truth of what is said.

*He spoke with his mouth*, is a pleonasm in English; it is none in Latin: Virgil says, *sic ore locutus*. Some French authors deny *unir ensemble, to unite together*, to be a pleonasm.

PLEROSIS, a word used by the old Greeks to express the repletion or restoring the body to its natural state, after it has been emaciated by sickness.

PLEROTICS, Πληρωτικά, formed from *πληρωω*, *I fill*, in *Medicine*, a kind of remedies, otherwise called *incarnatives*, and *sarcotics*.

PLES, in *Geography*, a town of Russia, in the government of Kostrom, on the Volga; 16 miles S. of Kostrom. N. lat. 57° 15'. E. long. 41° 14'.

PLESHY,

PLESHY, a village and parish, situated in the hundred of Dunmow, and county of Essex, England, though now containing, according to the parliamentary returns of 1811, only 46 houses, and 221 inhabitants, was a place of distinguished consequence in ancient times. Gough and Morant are both of opinion that it was the site of a Roman station, from the number of urns and Roman bricks which have been dug up here, and from the boldness and regularity of the entrenchment surrounding the village. The vallum of this work is still very perfect on three sides, and appears to have had four original entrances through it into the inclosed area. These circumstances, however, though plausible reasons for assigning to Pleshy a Roman origin, are not conclusive evidence. In the Saxon era no mention is made of this place; indeed its authentic history does not commence till the reign of king Stephen, when we are informed that it was vested in the crown by the king's marriage with Maud, granddaughter of Eustace, earl of Boulogne, by whom it is probable the castle here was first erected. Stephen granted it to William de Magnaville, high constable of England, who procured licence to fortify the castle from Henry II. Hence we conjecture that he was the person who constructed the fosse, as well as the immense keep, which remains to this day a proud monument of the ancient grandeur and strength of this once majestic fortrefs. The keep is oval shaped, and measures about 890 feet in circumference, and forty-five paces in breadth at the top.

Humphrey de Bohun, earl of Hereford, having succeeded to the estate and honours of the Magnavilles, obtained leave of Edward I. to enlarge his park at Pleshy, by inclosing 150 additional acres. In this family the castle and manor continued till the year 1372, when Thomas of Woodstock, afterwards duke of Gloucester, became possessed of them, and of the dignity of high constable, by his marriage with Eleanor, eldest daughter, and co-heiress of Humphrey, the last male heir of the Bohuns. This nobleman, whose busy life and tragical fate form conspicuous features in the history of England, was decoyed from the castle by his nephew, king Richard II., and treacherously put to death. Pleshy, after that event, devolved to Edmund, earl of Stafford, in right of Anne, the duke's daughter. It afterwards fell to the crown, and was annexed to the duchy of Lancaster. From that period the castle seems to have been totally neglected, but the date of its demolition is not mentioned. Leland says that this place was anciently called Tumblestoun, and that Pleshy is a corruption for Castell de Placeto. A college for a master and eight secular priests, two clerks, and two choristers, was founded here by Thomas of Woodstock in 1393. The original endowments were subsequently augmented by various benefactors: and at the time of the dissolutions its revenues were valued at 139*l.* 3*s.* 10*d.* per annum clear. This house was granted by Henry VIII. to sir John Gates, who razed all the old buildings, the college-church excepted, which he however also partly destroyed. It continued in a ruinous state till the beginning of the last century, when bishop Compton, having been promoted to the see of London, repaired such portions of it as were standing, and added a neat body of brick. The principal monuments here are those of sir William Jolliffe, knt., and his nephew, Samuel Tuffnell, esq., whose family here possessed the manor for upwards of half a century. Some memorial of the former consequence of Pleshy appears in the election of a mayor annually from among the freeholders of the village, at the court-leet for the manor. This custom is singular, and seems to indicate that Pleshy was at one time a corporate town. Beauties of England and Wales, vol. v., by John Britton and E. W. Brayley,

from Morant's "History, &c. of Essex," folio; and Gough's "History and Antiquities of Pleshy," 4to.

PLESMONE, a word used by the ancients to signify plenitude or satiety.

PLESSEVITZA, in *Geography*, a mountain of Croatia; 12 miles N.W. of Bihacs.

PLESSOW, a town of the duchy of Warsaw; 8 miles W. of Kalisch.

PLESTIN, a town of France, in the department of the North Coasts, and chief place of a canton, in the district of Lannion; 7 miles S.W. of Lannion. The place contains 4862, and the canton 9460 inhabitants, on a territory of 105 kilometres, in 7 communes.

PLESUR, a river of the Grisons, which runs into the Rhine at Coire.

PLESZ, or PLESSE, a town and fortress of Silesia, and capital of a lordship, in the principality of Ratibor, on the borders of Poland, surrounded with walls, flanked with towers, and containing two churches; 17 miles N.N.E. of Teschen. N. lat. 49° 57'. E. long. 18° 56'.

PLETCHBERG, a mountain of Switzerland, in the canton of Berne; 22 miles S.S.E. of Thun.

PLETHORA, πλεθωρα, in *Medicine*, from πλεωω, *impleo*, fullness of habit, or an abundance of blood.

Every increase of the fluids is sometimes called plethora; but the medical authors who speak definitely, limit the term to a superabundance of good blood. (See Van Swieten, Comment. ad Aph. 106.) This, then, is scarcely to be considered as itself a disease, but a degree of high health, bordering upon disease; a condition which predisposes to disease, and renders the person liable to be disordered by any exciting cause, by which the equilibrium of the circulation may be accidentally disturbed.

The mechanical physicians ascribed many of the morbid actions of the system to plethora; and they remarked, that an abundance of blood was inconvenient to the animal economy in a relative manner only, in different cases, *viz.* relative to the quantity, to the space occupied, to the bulk, and to the patient's strength. The first, plethora *ad molem*, or *ad vasa*, signified the absolute over-abundance of blood, as seen by the florid distention of the minute vessels, and detected by a full, oppressed, and labouring pulse. This occurs generally in vigorous constitutions, where the digestive powers are strong and active, and the waste from exercise disproportioned to the supply. The second, or plethora *ad spatium*, is produced when, the quantity of the circulating fluids remaining the same, the capacity of the vessels is diminished; as may be exemplified in the state of the circulation in cold weather, or in the cold fit of fevers. The third, or plethora *ad volumen*, implies the contrary condition, or that in which, the quantity remaining the same, the bulk is augmented, as by external heat, inflammatory diseases, stimulating food and drink, violent passions, &c. The blood, however, is not capable of much expansion; and both this and the preceding condition are occasioned rather by a change in the distribution of the blood, than by any actual variation in its condition. By cold, it is driven from the extreme vessels to those of the interior; by heat, it is admitted into the relaxed vessels of the external parts. The last, or plethora *ad vires*, signifies only a comparative weakness of the circulating powers; so that although the quantity of blood be not superabundant, yet it is greater than the vessels are enabled to distribute freely.

After all these refinements of pathology, it will be obvious that there is, in fact, but one kind of actual plethora, which is a real superabundance of blood, and is therefore the cause of a predisposition to disease, especially to fevers,

to all inflammatory affections, such as gout and pleurisy, to apoplexy, lethargy, palsy, and the rupture of blood-vessels. This plethoric state is produced by a vigorous digestive power in the stomach, especially in certain constitutions, which possess a lax texture of the venous system; and its production is favoured by taking copiously of food that is nutritious and easy of digestion, by quietness and composure of mind, by much sleep, and by indolence and inactivity as to muscular exertion. (See CORPULENCE.) The symptoms by which the existence of this plethoric state are indicated, are thus enumerated by Van Swieten: we know that it is present, he says, if there be a great redness over the whole body, especially where the cuticle is fine and delicate, as in the corners of the eyes, the inside of the eyelids, nose, mouth, lips, and throat; if the veins are distended, and the pulse at the same time is full and strong; and if upon unusual motion, or exposure to heat, or taking of wine, a sense of fullness and distention is felt throughout the body, and this is followed by dullness and drowsiness. Comment. loc. cit.

The cure of this plethoric state is not always easy. Blood-letting is attended with temporary relief; but it is apt to be followed by an increase of the fullness, if other circumstances are not attended to. But with it should be combined a system of diet, more cooling and spare, and of less nutritious substances, of regularity and freedom in the relaxation of the bowels, and a gradual attainment of the power of corporeal exertion, by taking exercise at first by way of gestation, and subsequently by the more active use of the muscles, even by bodily labour, if that prove requisite.

PLETHRON, a Grecian measure, by some said to contain 1444, by others 10,000 square feet. Arbuthnot.

PLETTENBERG, in *Geography*, a town of Germany, in the county of Mark, on the Elbe and the Oester, governed by its own magistracy. The parish-church belongs in common to the Lutherans and Calvinists. The inhabitants are employed partly in agriculture and breeding of cattle, and partly in the manufacture of coarse cloths and smith's work, particularly scythes; beside other handicrafts; 28 miles S. of Hamm.

PLETTENBERG'S Bay, a bay on the S.E. coast of Africa. Cape Seal, at the southern extremity of the bay, is in S. lat.  $34^{\circ} 6'$ . E. long.  $23^{\circ} 48'$ . Variation of the compass  $27^{\circ} 12'$  W. The tide flows at full or change  $3^h 10^m$ , and rises or falls five or six feet perpendicular. This bay scarcely seems capable, by any expence, of being rendered secure, even for small craft, in the winter months; but, in the summer season, ships may remain without any danger. Westward of this bay, at the distance of about eighteen miles, is *Knyfna*, which see. Plettenberg's bay is a division of the district of Zwelendam, which begins at the Kayman's river, and continues to the inaccessible forests of Sitikamma. The whole of this tract of country is very beautiful, agreeably diversified by hill and dale, and lofty forests. Within seven miles of the bay are large timber-trees, and the surface is almost as level as a bowling-green, over which the several roads are carried. The peasantry who inhabit this district are mostly wood-cutters, who earn a very hard subsistence. The great distance from the Cape of Good Hope, being 400 miles of bad road, allows them little profit on a load of timber, when sold at the dearest rate in the Cape market, so that they prefer disposing of it at the bay for a mere trifle. Plank of thirteen or fourteen inches in width, and an inch thick, may be purchased on the spot at the rate of *3d.* per foot in length. The bark of several of the creeping plants in the forest might be employed as substitutes for hemp; and the iron ores, near the base of the mountain, might be worked

by clearing away the wood, of which there is an inexhaustible supply. Barrow's Africa, vol. ii.

PLETZDORF, a town of Bavaria, in the bishopric of Bamberg; six miles W.N.W. of Burg Eberach.

PLETZKY, a town of Saxony; two miles W. of Gommern.

PLEVEN, a town of European Turkey, in Bulgaria, on the Vid; 28 miles S. of Nicopoli.

PLEUGLIA, a town of European Turkey, in Servia; 40 miles W. of Jembafar.

PLEVIN, PLEVINA, in *Law*, a warrant or assurance, the same with pledge. See PLEDGE, REPLEVIN, &c.

PLEUMANGAT, in *Geography*, a town of France, in the department of the North Coasts; 13 miles S.S.W. of Dinan.

PLEUMARTIN, a town of France, in the department of the Vienne, and chief place of a canton, in the district of Châtellerault. The place contains 1205, and the canton 7143 inhabitants, on a territory of 280 kilometres, in 12 communes.

PLEUMAUDAN, a town of France, in the department of the North Coasts; six miles S.S.W. of Dinan.

PLEUNOS, a town of Africa, in Barca. N. lat.  $31^{\circ} 40'$ . E. long.  $25^{\circ} 20'$ .

PLEURA, in *Anatomy*, the serous membrane, which lines the cavity of the thorax. See LUNG.

PLEURISY, PLEURITIS, in *Medicine*, an inflammation of the pleura, or membrane surrounding the lungs.

The pleurisy has been generally distinguished by medical writers from the peripneumony, or inflammation of the substance of the lungs; by the greater acuteness of the pain in the side, increased on inspiration, the greater hardness and strength of the pulse, the dryness of the cough, and the greater violence of the fever. It is in fact, however, only a modification of the same disease with the peripneumony; whence Dr. Cullen gave the same generic name *pneumonia* to both. We shall, therefore, refer the reader to the former article, where all the modifications of pneumonic inflammation are discussed at length. See PERIPNEUMONY.

PLEURITIS, the pleurisy.

PLEUROCYSTUS, in *Natural History*, the name of one of the general arrangements of the echini marini.

The word is derived from the Greek *πλευρος*, the side, and *κυστις*, the anus.

The echini of this division are distinguished from the others, by having their anus neither on the summit, nor in any part of the base, but in some part of the superficies of one of the sides.

PLEURODYNE, in *Medicine*, from *pleura* and *δύνη*, pain, signifies a pain of the side, independent of inflammation, as *pleuritis* denotes the pain arising from inflammation.

A stitch or pain in the side often occurs, independently of any acute inflammation of the lungs, pleura, or contiguous organs, and it is generally increased by the action of breathing. It has been often denominated a false or *spurious pleurisy*. The pain, however, is seldom seated in the membrane called the pleura, but often in the muscles of the chest, sometimes in the other membranous parts; and it may arise from rheumatism affecting those parts, from spasm or cramp, from a plethoric condition, or from a nervous and hysterical state, in which the circulation is languid and irregular: it may also be connected with a gouty, syphilitic, or scorbutic habit. Sauvages has distributed the pleurodyne into eighteen species, according to its origin from one or other of these causes. (See his Nosol. Method. class v. gen. ii.) The term is now most commonly applied to rheumatic pains affecting the muscles of the ribs and the diaphragm. See RHEUMATISM.

PLEURON, in *Ancient Geography*, the name of two towns

towns in Ætolia, the *Old* and the *New*; the former situated near Calyon, and the latter near mount Aracynthus.

**PLEURONECTES**, in *Ichthyology*, a genus of fishes of the order Thoracici, of which the generic character is; head small; eyes spherical, both on the same side of the head, and near each other; mouth arched; jaws unequal, toothed; gill-membrane with from four to seven rays; the cover generally of three laminæ; the body is convex and coloured above; flat and paler beneath; the vent is nearer the head.

This genus, which consists of about thirty species, comprehends those which are denominated flat-fish. The structure of this fish is considered as one of the most curious deviations from the general uniformity or regularity observed by nature in the external figure of animals, in which, with a few exceptions, both sides of the body are perfectly similar: but in the genus *Pleuronectes*, the animal is so constituted, that one side appears to represent the back, and the opposite side the abdomen. They swim obliquely or on their sides, and the two eyes are always placed on one side, and it is from this circumstance that the sections into which the species are divided, are constituted; that is, according as the eyes are on the right or the left side. The fish of this genus reside at or near the bottom of the water, owing to their having no air-bladder: they often bury themselves in the sand as far as the head, by which means they escape the jaws of the more rapacious tribes; the eyes are covered with a nictitant membrane; the nostrils are double and contiguous; the belly is without ribs; the fins are soft, and mostly with simple rays; the ventral and pectoral long, the tail generally rounded, with bifid rays.

*A. Eyes both on the right Side of the Head.*

**TRICHODACTYLUS**. Body rough; pectoral fins filiform. This is only known from the description of Artedi, who says that it is rough, of a grey colour, with dusky variations. It is a native of the Indian seas, and found about Amboina.

**ZEBRA**. Body with numerous transverse bands. This is reckoned a very elegant species, and readily distinguishable by its colours, the upper part being white, with a brownish cast towards the back, and marked from head to tail by numerous, double, deep brown, transverse bands, passing across the fins themselves. It is rather larger than the common sole. It is a native of the Indian seas, and in considerable esteem as an article of food.

**PLAGIUSA**. Body oblong, somewhat rough; dorsal and anal fins joined to the tail. It inhabits Carolina; the body is pale and cinereous.

**OCELLATUS**. Body with four dark brown ocellate spots; the irids are white. Found in the sea about Surinam.

\* **HIPPOGLOSSUS**; Holibut. The body of this species is perfectly smooth; the tail is lunate. This species not only exceeds in size all the rest of the present genus, but may be considered as one of the largest of fishes, properly so called, having been found of the weight of three or four hundred pounds. It is a native of the Mediterranean and Northern seas, but appears to arrive at its greatest size in the latter; it is the most voracious of the whole tribe, preying on a variety of other fishes, as well as upon different kinds of crabs, shell-fish, &c. It is of a longer or more slender form than most other flat-fish. It is not much regarded as an article of food.

**CYNOGLOSSUS**. Body oblong, smooth; teeth obtuse; tail a little rounded. It is extremely allied to the preceding, and has been regarded rather as a variety than a distinct species.

It is a native of the Northern seas, and found in considerable numbers in deep bays about the coasts of Greenland.

\* **PLATESSA**; Plaife. Body smooth; behind the left eye there is a row of six tubercles reaching to the lateral line. The plaife is easily distinguished from the others of the genus by its shape and colours, being very broad and flat; of a fine palish brown above, marked both on the body and fins by pretty numerous orange-coloured spots; the under side is white. It is an inhabitant of the Mediterranean, the Baltic, and Northern seas, and is found in considerable plenty about our own coasts. The flesh is very good, especially of those that run to a large size.

\* **FLESSUS**; Flounder. Lateral line rough; short spines on the right side of the fins. The flounder is an inhabitant of the same seas as those in which the plaife is found. It is extremely common about our own coasts, and frequents our rivers at a considerable distance from the salt waters; it is in considerable esteem as food, and great quantities are brought to the London markets.

\* **ROSEUS**; Rose-coloured Flounder. Body rosy; fins pale yellow-brown. It is frequently taken in the Thames.

\* **LIMANDA**; Dab. Scales very small, ciliate; spinules at the root of the dorsal and anal fins with obtuse teeth. It inhabits the European seas; is less and thinner than the flounder; feeds on worms and insects, especially small crabs; it spawns in June; the flesh is reckoned very good.

\* **LEVIS**; Smear-dab. Brown, with obscure yellow spots, beneath white, with five large dusky spots; scales smooth; the dorsal fin has seventy-nine rays. It is about eighteen inches long, and the flesh is reckoned good for food.

**LIMANDOIDES**. Body oblong, rough; lateral line straight, broad. It is found in the Northern seas; it resembles the plaife; the flesh is very good.

**SOLEA**; Sole. Body oblong, rough; the upper jaw is longer. The sole is an inhabitant of the Northern, Baltic, Mediterranean, and American seas, and grows to the length of two feet or more, and to the weight of six or eight pounds; its general size is, however, very much smaller. It is covered with small rough scales of an oblong form, each terminated by numerous spines, and very strongly fastened to the skin. These scales, from the elegance of their structure, have long since formed objects for the microscope; an erroneous idea sometimes prevails that the spiny end of the scale is that by which it is inserted into the skin. This fish delights in lying at the bottom of the coasts which it frequents, preying on small shell-fish, spawn, sea-insects, &c.: it is generally taken by the trawl-net. The chief fishery is said to be at Brixham, in Torbay.

\* **ARNOGLOSSUS**; Smooth Sole. Thin, pellucid, white, smooth. It is found, though but seldom, on the coasts of Cornwall.

**LINGUATULA**. Vent on the left side; the teeth are very sharp.

**GLACIALIS**. Very smooth; above brown, beneath white; middle rays of the dorsal and anal fins rough, with small spines. It inhabits sandy places in the Frozen sea, and is about nine inches long.

**PLATESSOIDES**. Body above with brown spots. It inhabits sandy places in the mouths of rivers in Greenland; it is scarcely a foot long; feeds on small worms and fish; in *shape* it resembles the *R. linguatula*; in its *scales*, the sole; and in its *spots*, the plaife.

*B. Eyes both on the left Side of the Head.*

**LINEATUS**. Body rough, barred with black; it has no pectoral fins. It inhabits North America.

**BILINEATUS**.

**BILINEATUS.** Lateral line double, and also without pectoral fins. It is a native of China.

**PUNCTATUS.** Body broad and very rough. It inhabits the deep sandy places of the Northern sea. It is reckoned a great delicacy in Denmark.

\***RHOMBUS;** Pearl. Body smooth. It is found in European seas, and is the broadest of its size, except the turbot; the body is covered with small scales, deep brown, with dirty yellow spots, beneath white; the flesh is very good, but inferior to the turbot described below.

**DENTATUS.** Body oblong, smooth; teeth extending out of the mouth. It inhabits Carolina.

\***MAXIMUS;** the Turbot. Body rough. This fine fish, so highly prized by epicures, inhabits the European and Mediterranean seas; grows sometimes to thirty pounds weight; it is very voracious, and feeds on insects, worms, and testaceous animals; the body is squarer than any other species; it is covered with obtuse, unequal, spinous tubercles; above it is brown, varied with yellow; beneath it is white, spotted with brown; the flesh is firm and excellent. For the method of catching turbot, see the article **TURBOT.**

\***PASSER;** Whiff. Lateral line much curved, prickly. It is a native of European seas, and is about a foot long; the flesh is good.

**PAPILLOSUS.** Lateral line curved; body papillous. It inhabits America, and is supposed to be a variety of the last.

**MANCUS.** Head tuberculate; pectoral fins unequal. It inhabits the sandy bottoms of the Brasil and Pacific seas.

**ARGUS.** Body variegated; tail rounded; jaws equal. It is found in the neighbourhood of the Caribbee islands; the body is covered with small soft scales, and variegated with yellow spots, which are dotted with brown, and edged with blue; the body is sprinkled with brown points.

**LUNATUS.** Body with scattered, blue, half ocellate spots. It is a native of the North American seas; the tail is lunate.

**JAPONICUS.** Tongue rough. It is a native of the Japan seas. It is about six inches long; the colour is brownish above, and whitish beneath; rays of the dorsal and anal fin so extremely numerous as to be counted with difficulty.

**PLEURO-PERIPNEUMONY,** or **PLEURO-PNEUMONY,** in *Medicine*, a term employed to denote the most common form of pulmonary inflammation, in which both the pleura and the lungs are involved in the disease at the same time. See **PERIPNEUMONY.**

**PLEURORTHNOPEA,** a term used by medical writers to express that kind of pleurisy in which the patient cannot breathe, unless in an erect posture.

**PLEUROTHALLIS,** in *Botany*, from *πλευρα*, the side, and *θαλλος*, a bough or frond, apparently in allusion to the lateral insertion of the inflorescence, the whole plant often consisting of but a simple leaf with its stalk; and at the side, where both unite, the flowers are produced.—Brown MSS. Ait. Hort. Kew. v. 5. 211. — Class and order, *Gynandria Monogynia*. Nat. Ord. *Orchideæ*.

Eff. Ch. Lip of the nectary connected, by a joint, with the base of the column. Two lower calyx-leaves combined underneath. Masses of pollen two, without a furrow. *Br.*

1. *P. ruscifolia.* Butcher's-broom leaved Pleurothallis. (*Dendrobium ruscifolium*; Swartz *Orchid.* 94. Willd. Sp. Pl. v. 4. 135. *Epidendrum ruscifolium*; Jacq. Amer. 226. t. 133. f. 3. Linn. Sp. Pl. 1353. *Helleborine ruscifoliae* folio; Plum. Ic. 171. t. 176. f. 2.)—Stem elongated. Leaf solitary, ovate-lanceolate. Flowers aggregate, at the base of the leaf.—Native of woods in the West Indies. It flowers in the stove in May and June. The pe-

rennial roots consist of numerous long simple fibres, growing parasitically on the branches or stems of trees. *Plants* several, about a span high, forming a tuft, like small lilies of the valley, but the flowers are not much elevated. Their form we have not had an opportunity of seeing.—We presume the two other species in Plumier's tab. 176, belong to the same genus; but the above is alone mentioned in Hort. Kew.

**PLEURS, PLURS,** or *Piuoro*, in *Geography*, a town of Switzerland, which was formerly large and flourishing, and subject, as well as Chiavenna, to the Grisons. It is said to have contained three churches, many large houses, and a stone bridge over the Maria, and that its population amounted to at least 1500 inhabitants, who carried on no inconsiderable commerce. But it was totally overwhelmed by the fall of mount Conto, which terrible catastrophe happened on the 25th of August, 1618. The valley in which it was situated is very narrow, and the whole town was buried in one undistinguished ruin. A contemporary account relates, that the cloud of dust and rubbish was so great as to cover the heavens like smoke, and even to extend as far as Chiavenna; the inhabitants of which place, alarmed at the phenomenon, were still more terrified at the sudden disappearance of the river Maria, the course of which was stopped by the fallen fragments of rock, and apprehensive that the torrent had undermined Chiavenna, they precipitately fled in great numbers to the mountains. A part of the ancient walls, and the ruins of a country house, belonging to the richest family in the place, are the only remains of its former existence.

**PLEURUIT,** a town of France, in the department of the Ille and Villaine, and chief place of a canton, in the district of St. Malo. The place contains 6596, and the canton 10,973 inhabitants, on a territory of 75 kilometres, in 4 communes.

**PLEUVAULT,** a town of France, in the department of the Côte d'Or; 12 miles S.E. of Dijon.

**PLEXUS,** in *Anatomy*, a term applied to various parts of the body, and particularly where several nerves or blood-vessels are united together. The plexus choroides is situated in the lateral ventricle of the brain. (See **BRAIN**.) The plexus pampiniformis is made up of the ramifications and unions of the spermatic vessels. (See **GENERATION**.) In the nervous system plexuses are frequent, particularly in the great sympathetic. See **NERVOUS System.**

**PLEYBEN,** in *Geography*, a town of France, in the department of Finisterre, and chief place of a canton, in the district of Chateaulin; five miles N.E. of it. The place contains 3972, and the canton 14,404 inhabitants, on a territory of 375 kilometres, in 9 communes.

**PLEYBERG,** a town of the duchy of Carinthia, formerly called "Auffenstein;" 20 miles E. of Clagenfurt.

**PLIANT** *Mealy Tree*, in *Gardening*, a common tree in plantations. See **VIBURNUM.**

**PLICA,** in *Medicine*, commonly mentioned with the epithet *Polonica*, because the disease is endemic in Poland, and the neighbouring countries, is an affection of the hair, which becomes matted together, and thickened, so as to form masses which cannot be unravelled, in consequence of the deposition of a morbid matter in and about the hair.

The disease is called *Koltum*, or *Koltek*, in Poland; and by the Germans *Weichsel-zopff*, on account of its prevalence in the region watered by the Weichsel, or Vistula. Sauvages and the nosologists have denominated it *Trichoma*. As the disease is never seen in this country, except by the accidental visit of a person affected with it from the country

where it prevails, we can only describe it after the writers who have witnessed it. The most clear and concise account of it is given by M. de la Fontaine, surgeon at Warfaw, in his surgical and medical treatises on various subjects respecting Poland, published in German, from which we shall extract the following history.

The symptoms which precede the morbid affection of the hair are very various, and often put on the appearance of other diseases. Thus pseudo-rheumatic pains are sometimes the antecedents of the malady: and it is said that apoplexy, mania, and various nervous diseases are apt to occur, as well as inflammations, particularly of the eyes, indurations of the glands, gangrene, and caries, more particularly of the nasal bones and cranium. Sometimes, however, the *plica* comes on without any previous symptom, even in the course of one night; and violent passions of the mind, especially rage and terror, are said to have caused it instantaneously. The most common symptoms of its approach are, a sense of weight and torpidity in all the limbs, pains in the back, giddiness, difficulty of breathing, ringing in the ears, with an increased secretion of cerumen, dull pains in the orbits of the eyes and lacrymal glands, with an augmented flow of tears, head-ache, violent itching and prickling in the hairy scalp, pain in the præcordia, and depression of spirits. In many patients there is a remarkable change in the appetite, a craving for spirituous liquors, and for new and strange kinds of food, while they loathe the things which they used to relish most. But the most certain signs that a *plica* will soon be formed, are clammy sweats about the head, with a diminution of pains, and a sensation of tightness, as if the upper parts of the head were drawn together.

The hairs now begin to grow greasy, and emit a remarkably disagreeable smell. The patient has frequent alternations of shivering and heat, and feels an unpleasant prickling cold under his nails. Under these circumstances, a sort of crisis takes place, upon the deposition of the morbid matter upon the hair and nails, and the symptoms of ill health immediately disappear, except in some rare cases, where a new deposition is to take place, and the crisis is therefore imperfect. The matter is deposited in the hairs, and sometimes in greater quantity than they can contain; they then burst, and a prodigious quantity is poured out between them, gluing them together. It is not true, that the hairs extend so much that blood flows out of them, as has been affirmed, or that they bleed on being cut. Occasionally the matter is not only deposited in the hairy scalp, but upon the hair of the pubis, of the arm-pits, or upon the nails. If the symptoms continue, a second *plica* will certainly be formed, but not until the first has separated from the head, and new hair has grown: it is never certain, however, that a second will not be formed; for the disease often takes on a kind of periodic form. A constant sense of cold about the head, and particularly at the temples, is a sure sign of its returning.

Sometimes the whole matter is deposited in one half of the hair, the other half remaining sound: in which cases, the previous symptoms attack only one side of the body. The peculiar form of the matting depends upon the previous fashion of the hair: most of the men cut it short, while the women, on the contrary, have uncommonly long and beautiful hair. The morbid matter is first deposited in the rete Malpighii, from whence it penetrates into the hair, sometimes slowly, sometimes rapidly. The moisture oozing out from the hairs bind them so together, that it is impossible to separate them again: if the whole hair be affected, it forms a kind of cap; if it flow out more partially, several tails or rope-like *plicæ* are produced. Some

days after the mass of disease has been formed, it begins to emit an odour like that of rancid fat; and when it is touched, it excites a prickling unpleasent sensation in the fingers. M. Fontaine dissected a patient, in whom the *plica* had come on just before death, and he found the bulbs of the hair larger than natural, from which he pressed out a pale yellow clammy mucus. In another, in whom the *plica* was already old, he found nothing remarkable. The *plica* is apt to be productive of prodigious numbers of lice, from which the patient suffers even more than from the disease.

All writers have divided the *plica* into several species, according to the various forms which it assumes. Sauvages has described three species. 1. *Trichoma cirrosum*, or what the French call *plique en cordons*, is the most common form, when it appears in long tails or cords, as before mentioned. It was called absurdly enough by Schultz, *plica mas*, or the male *plica*. 2. *Trichoma villosum*, the *plica femina* of Schultz, when the disease is more generally diffused. And 3. The *Trichoma Polonicum*, when it suddenly extends to a great size, and forms a cap over the head. M. Albert, in the treatise "Sur les Maladies de la Peau," which he is now conducting, has also divided the *plique* into three species, and points out several varieties under each. His first is *Plique multiforme*, or *Plica caput-medusæ*, which applies to the tail-like or serpentine agglutinations, which may not be inaptly compared to the fabulous head of Medusa. His second species is *Plique à queue, ou solitaire*, or *Plica longi-cauda*, in which the *plicæ* are not divided, as in the former species, but reunite and form one tail-like mass, not unlike the tail of a quadruped, often acquiring a great length. And his third is *Plique en masse*, or *Plica cespitosa*, in which a conglomerated mass is formed over the head, without any tail-like divisions. These arbitrary classifications afford at least some distinct notion of the varieties of appearance which the disease assumes.

The proximate cause of the *plica*, according to M. de la Fontaine, is a peculiar morbid matter, which is clammy and acrid, has its seat in the lymph, and is deposited critically upon the hair or nails. When it is deposited upon the nails, either of the hands or the feet, they become larger, thicker, prominent, deformed, horny, and ill-coloured, but not black.

The exciting causes are altogether uncertain; for neither the air, water, nor food, seems to have any influence in producing it; nor are cleanliness and regular combing the hair any defence against it. Experience shews, however, that it is a contagious disease, and very often congenital; at the same time, those to whom it is communicated by contact are said to have it slightly, and to be easily cured. It spares no sex, age, or condition, nor even newly arrived strangers, and some infants bring it into the world with them: the lower classes of the people, however, suffer most from it; and those who have soft brown hair are most frequently affected, though no colour escapes. The *plica* is never white; but when it drops off in old people, it is sometimes succeeded by white hairs. Peles, who travel, are sometimes affected with it in other countries, and even their children. There is no accurate history of its origin: the Greeks, Romans, and Arabians have not mentioned the disease; but some modern writers affirm that it was imported from Tartary in the year 1387. It now prevails in Tartary, White and Red Russia, Lithuania, and from the source of the Vistula to the Carpathian mountains; but is more frequent in some districts than in others.

The method of cure recommended for *plica* varies with the circumstances of the case. When fever is present, moderate evacuations

evacuations must be referred to; but blood-letting is to be employed with great caution. M. de la Fontaine compares the disease with the small-pox, in which, when the febrile action is too feeble to produce the eruption, it must be increased; when it is too violent, it must be diminished. Hence the patient must be, in some instances, supported by generous diet; while, in others, a spare regimen must be adopted. In order to bring about the crisis, the same writer recommends the use of sudorifics, and appears, indeed, to consider antimony as a specific in this disease. The older physicians praise the lycopodium as possessed of specific powers, but without any good grounds; and the common people believe in a great number of specific remedies, but the disease has not become less frequent, notwithstanding these supposed means of cure. Mercurials, especially when carried to the extent of exciting salivation, are said to be highly detrimental in every case; but if the disease be complicated with syphilis, the corrosive muriate of mercury is very beneficial.

External remedies are almost always necessary; such as the application of warmth to the head, in the form of vapour, warm bath, or fomentations made with the decoctions of various plants: a decoction of soap is esteemed beneficial when the head-ache is severe. Sinapisms and blisters are likewise applied with advantage. The plica may, or may not, be cut off according to circumstances. After a complete crisis, it separates from the head, and remains attached only by found hair. This may take place in a few days, weeks, or months. If it has lost its peculiar smell and greasy appearance, has become dry, and all concomitant symptoms have ceased, it may be cut off by dividing the found hair: for it is remarkable, that even an old plica cannot be cut in the middle without giving pain. The new hair may be washed with warm water, and combed out. If, however, the plica be new, fit fast on the head, cause a prickling in the fingers when touched, and the general symptoms have not subsided, it must not on any account be cut off. The most dreadful accidents often immediately ensue from such practice. Some have become instantly blind, or have died from apoplexy, or in epileptic convulsions. The people are so much afraid of this, that they will seldom permit the plica to be cut off, even when it may be done with safety. If bad consequences follow the cutting off of the plica, the most certain and speedy remedy is to apply it in its former situation. This must be done before it becomes dry; and it is almost incredible, says M. de la Fontaine, that, after one, two, three, or more days, it will again adhere to the head. He does not maintain that it grows to the stumps of the hair; but that innumerable examples prove, that a kind of callus is formed, as in a fractured bone. If the plica be not brought to adhere again, the patient, if he survive, remains excessively sick, until the hair grow, and a new plica be formed. The Jews, who are bigotted to their own customs and methods of cure, never permit it to be cut off, and nothing can be more disgusting than one whose beard and whiskers are affected with this disease.

If the morbid matter be deposited on the surface of the body, it is said to occasion malignant and obstinate sores, which give a great deal of trouble. If it have a tendency to deposit itself in the nails, it must be encouraged by the application of stimulants, such as tincture of cantharides, blisters, or by touching a fresh plica with the fingers. The nails do not separate so readily as the hair, and can only be safely cut off when new nails have begun to grow; and this often does not happen. The Poles believe, that keeping their hair short; or even shaving the head, is a preservative

against this disease; but, on the contrary, the men suffer much more than the women, whose hair is long; and it at last affects the hair on other parts of the body.

M. de la Fontaine recommends a mild, attenuant, and corrective diet, as in other diseases proceeding from acrimony of the fluids, with the use of ripe fruits. The correctness of his advice, however, may be justly questioned, since he informs us, that the diet of the common people in Poland consists almost, if not entirely, of vegetables, which are generally made four. He concludes by this singular observation, that, if all these means be inadequate to produce the crisis, *inoculation* of the disease will often effect it; and that this is performed by putting on a cap, which has just been worn by one who has a recent plica. See Duncan's *Annals of Medicine*, vol. i. sect. 1. Haller, *Disputationes Med.* tom. i. art. 16, 17. Alibert, *Précis Theorique et Pratique sur les Maladies de la Peau*, p. 92, et seq. *Memoirs of the Literary and Philosophical Society of Manchester*, vol. iv. part 2.

PLICA, Lat. a pleat, a fold, a wrinkle, the name of a musical character in the first time-table that was formed. It was a kind of ligature, or retardation (*signum morositas*, says de Muris); it served for a series of notes in passing from one sound to another by regular degrees from a semitone to a 5th ascending, and descending: it was of four kinds: 1. The long plica ascending, a square figure with one single stroke or tail ascending, . 2. The long plica descending has two strokes or tails, one longer than the other, . 3. The short plica ascending has a single tail on the left side turned up, . The 4th plica has a single tail on the left side descending, .

PLICARIA, in *Botany*, a name used by some for the club-moss.

PLICATED LEAF. See LEAF.

PLIGHT, in our old *Law Books*, a term which signifies the estate, with the quality of the land; though sometimes it extends also to the rent-charge, and the possibility of a dower. Coke's *Inst.* fol. 221.

PLINIA, in *Botany*, so named by Plumier, in memory of the famous Roman naturalist; see PLINY. Plum. *Gen.* 9. t. 11. Linn. *Gen.* 270. Schreb. 337. Willd. *Sp. Pl.* v. 2. 998. Mart. *Mill. Dict.* v. 3. Jusl. 342. Lamarck *Illustr.* t. 428.—Class and order, *Icosandria Monogynia*. Nat. Ord. *Hesperideae*, Linn. *Rosaceae affine*, Jusl.

Gen. Ch. *Cal.* Perianth inferior, small, of one leaf, flat, in five acute reflexed segments. *Cor.* Petals five, ovate, concave, widely spreading. *Stam.* Filaments twenty, inserted into the calyx, capillary, longer than the corolla; anthers globose. *Pist.* Germen superior, roundish; style awl-shaped, wavy; stigma simple. *Peric.* Drupa globose, furrowed, of one cell. *Seed.* Nut solitary, large, ovate, rough, cloven at the summit.

Eff. Ch. Calyx in five segments. Petals five. Drupa superior, furrowed. Nut rough.

Obs. Every botanist, who has attended, in any manner, to the subject, is aware of the great obscurity that envelops this genus, which depends chiefly on the authority of Plumier, and which no succeeding botanist has been able to verify; except perhaps Allamand, from whose communications Linnæus corrected the generic character as above. Some have supposed Plumier to have been totally mistaken, as to the germen being superior, and that *Plinia* is no other than

than an *Eugenia*. Linnæus, and Allamand possibly, confounded these genera in their ideas; for their *P. rubra* is, as every body knows, *Eugenia uniflora*. See Willd. Sp. Pl. v. 2. 962, where its multifarious synonyms are correctly stated; see also our article EUGENIA. We subjoin all we can find upon record of the original and only species of *Plinia*, of which we have never been so fortunate as to see a specimen.

1. *P. crocea*. Orange-fruited *Plinia*. Linn. Mant. 244. Willd. n. 1. (*P. pinnata*; Linn. Sp. Pl. ed. 1. 516. ed. 2. 735. *P. pentapetala*; Linn. Mant. 402. *P. fructu croceo, odorato*; Plum. Ic. 219. t. 225.) By Plumier's figure, which is our only guide, this appears to be a tree, with round alternate branches. The leaves are opposite, nearly sessile, ovate, pointed, entire, about three inches long and one broad, apparently smooth, with one rib, and many transverse incurved veins. Flowers scattered over the larger branches, nearly sessile, solitary, scarcely so big as a hawthorn blossom, the tapering style projecting beyond the numerous stamens, which are themselves longer than the petals. Fruit globular, saffron-coloured and fragrant, according to Plumier, the size of a large gooseberry, deeply furrowed and wrinkled. Nut more slightly furrowed, or rather quite globular and only striated, large, with a thin shell, and full kernel.

Burmah, the editor of Plumier, misconceived the leaves to be abruptly pinnate, taking the whole branch for a leaf. Linnæus adopted this error, and having once made a false step, he floundered deeper and deeper in trying to correct himself, altering the specific name time after time, and contracting the plant with one of a different genus; into which last mistake he was indeed led by his correspondent Allamand. We do not presume to throw any new light on this obscure point of botanical history, but what we have collected may serve to assist those who may be so fortunate as to meet, in some part of the West Indies or of South America, with the plant Plumier described. Dr. Swartz, who investigated the former with great industry, seems never to have seen the *Plinia*; nor has he, in his *Observations Botanica*, 203, done more than indicate the generic confusion, to which we have sufficiently adverted.

PLINIA, in *Gardening*, comprises a plant of the exotic shrubby kind for the stove, of which the species cultivated is the red-fruited *plinia*, or myrtle (*P. pedunculata*.)

*Method of Culture*.—It is increased by the seeds, which should be procured from abroad, and which should be sown in pots, filled with rich mould, plunging them in a bark hot-bed, when they appear in the same season. They may also be increased by planting cuttings of the young shoots, in the later spring and summer months, in pots filled with good earth, covering them with hand or bell-glasses, and watering them occasionally. They may be so rooted as to be fit for removing into separate pots the same year.

It is a plant highly ornamental in stove collections, from its flowering in the winter season.

PLINIANA, in *Geography*, a town or rather village of Italy, in the department of the Lario; six miles N. of Como. This place is remarkable for a singular fountain, which is still to be seen in the same state as described by Pliny, lib. iv. cp. 30. This spring bursts from a rock, and falls in natural cascades into the lake of Como. It ebbs and flows three times a day; gradually rising until it forms a considerable stream, and then as gradually subsiding till it becomes almost dry.

PLINLIMMON, a mountain of Wales, in the N. part of the county of Cardigan, on the borders of Montgomeryshire.

PLINTH, from  $\pi\lambda\theta\theta\alpha\iota$ , *brick*, in *Architecture*, a flat square member, in form of a brick: sometimes, also, called the slipper.

The plinth is used as the foot, or foundation of columns: being that flat square table, under the mouldings of the base and pedestal, at the bottom of the whole order, seeming to have been originally intended to keep the bottom of the primitive wooden pillars from rotting.

The plinth is also called the *orle* or *orlo*.

Vitruvius also calls the Tuscan abacus, plinth, from its resembling a square brick.

PLINTH of a *Statue*, &c. is a base or stand, either flat, round, or square, serving to support a statue, &c.

PLINTH of a *Wall*, is a term for two or three rows of bricks advancing out from the wall; or in the general for any flat high moulding, serving in a front wall to mark the floors; or to sustain the eaves of a wall, and the larmier of a chimney.

PLINTHITIS, a kind of alum found in some of the islands of the Archipelago, and called also *placitis*, from its usually being found in thin cakes.

PLINTHIUM, a name given by the ancients to a machine invented for the making extension of dislocated or fractured limbs. Oribasius describes several kinds.

PLINY, the elder, CAIUS PLINIUS SECUNDUS, in *Bio-graphy*, a distinguished Roman writer, was born, it is thought, at Verona, in the reign of Tiberius, A.D. 23. He was descended from an illustrious family, and served in the army during the wars in Germany. He rose to various public employments under the emperors Nero, Vespasian, and Titus. It is said that there is scarcely a man of business who was so devoted to study, or comprehended such an extent of literary research. The following is the mode of his spending his time at Rome, when he was high in the possession of the imperial favour. Before day-break he waited upon Vespasian, who was also an early riser, and then proceeded to execute the emperor's orders. On returning home he employed the rest of the day in study. After taking a light repast, he reclined in the sun according to the Roman custom, while a book was read to him, from which he took notes. He never perused any work without making extracts, as he was accustomed to say "that no book was so bad as not to afford something valuable." He then bathed, slumbered a little, and rising fresh, as if to a new day, studied till supper time. Even during that repast a reader was at his side, as there was upon all his journeys; and a vacant hour never occurred which he did not employ in reading and writing. Of his avarice of time, his nephew, the younger Pliny, gives the following instance: one of his friends having obliged the reader to repeat something that he had pronounced improperly, "Did you understand him?" said Pliny, "I did," he replied. "Why then did you stop him? We have lost more than ten lines by the interruption." He always went from place to place in a sedan, that he might read on his road, and reproved his nephew for walking as so much time lost. The plan thus adopted by the philosopher, it might be supposed, would have precluded all original observation and reflection; but he was diligent in natural pursuits, and it was his ardent curiosity and thirst of knowledge that occasioned his death. He had the command of the fleet stationed at Misenum, when, in the month of August, A.D. 79, a great eruption of Vesuvius broke out. On its first appearance he steered directly to the spot, as well for the humane purpose of giving assistance to the fugitives, as for viewing the progress of the eruption. The volcano raged with the utmost fury, and spread alarm through all the vicinity. While others were flying he ordered his pilot

pilot to steer directly across to Stabiæ, where his friend Pomponianus had a villa. He there landed, and passed the night in the house. In the mean time showers of ashes almost blocked up his apartments, while the walls were shaken with an earthquake, and towards the morning it appeared necessary to quit the place. In his flight he was suffocated, being then in the 56th year of his age, high in reputation and dignity, and in great esteem with the emperor Titus. His works are as follow; "On the Use of the Javelin on Horseback;" "On the Life of Pomponius Secundus;" "Of the Wars in Germany," in twenty books; "On Oratory," three books; "On Grammar," eight books; "On the History of his own Times," thirty-one books; "On Natural History," thirty-seven books. Of all these works, that on natural history is the only one that has come down to our times, and it is regarded as one of the most valuable relics of classical antiquity. The editions of this work were very numerous at an early period, and many learned men have employed their talents in correcting the text. Harcourt was supposed to be one of the most successful as well as industrious editors. His edition, in five volumes 4to., Par. 1685, was superior to any at that time published. He has been succeeded by others, and in 1779, Brotier gave a new edition at Paris, in six vols. 12mo., which is much esteemed.

PLINY, the younger, C. PLINIUS CÆCILIUS SECUNDUS, born at Como, in the reign of Nero, A.D. 62, was the son of L. Cæcilius, by a sister of the elder Pliny. He was sent to Rome for education, and after perfecting himself in the Greek language, he was placed under the tuition of Quintilian and Nicetes. His disposition and talents caused him to be adopted by his uncle Pliny, and destined to be the heir of his name and fortune. He was in the eighteenth year of his age when the eruption of mount Vesuvius took place, which proved fatal to his uncle. He had imbibed so much of his uncle's ardour for study, that he chose to remain reading the history of Livy, rather than accompany his uncle to a nearer view of the interesting but fatal phenomenon. He began to plead causes soon after his uncle's death, but his labours in this way were soon interrupted by a campaign into Syria, with the rank of military tribune. He did not, however, wholly abandon his literary pursuits in that situation, but availed himself of the presence of the philosophers Euphrates and Artemidorus, who had been banished Rome, with the other professors of philosophy, by Vespasian. After his return his reputation for eloquence stood so high, that when he was likely to harangue the people, vast crowds attended, and he was sure to be greeted with the loudest applauses, in which even the judges sometimes joined. In the reign of Domitian he was raised successively to the offices of quæstor, tribune of the people, and prætor. Under Nerva he was appointed to the office of præfect of the Saturnian treasury. In the third consulate of the emperor Trajan, Pliny was one of the honorary consuls termed *suffecti*, and on this occasion he returned public thanks to the emperor in an oration, which he afterwards enlarged to the panegyric of Trajan. After this the care of the channel, and the banks of the Tiber, was next conferred upon him, with the augurate; and then he was appointed proconsul; whence he wrote to Trajan that curious letter concerning the primitive Christians, which is extant among his epistles. Pliny's letter is esteemed as almost the only genuine monument of ecclesiastical antiquity, relating to the times immediately succeeding the apostles, it having been written within about forty years after the death of the apostle Paul. It has been preserved by Christians themselves, as a clear and unsuspecting evidence of the purity of their doctrine and practice,

and is frequently appealed to by the early writers of the church against the unprovoked calumnies of their adversaries. It is not known what became of Pliny after his return from Bithynia; antiquity is also silent as to the time of his death; but it is conjectured, that he died either a little before or soon after Trajan; that is, about the year 116.

It appears that he lost his first wife in the beginning of Nerva's reign, and that soon after he married his beloved Calpurnia: he never had any children. He was one of the greatest wits, and one of the worthiest men among the ancients. He had fine parts, which he cultivated with great care. He wrote and published a great number of pieces; but nothing has escaped the wreck of time except the books of Letters, and the panegyric upon Trajan. This has ever been regarded as a master-piece of excellent composition. It is an elaborate specimen of true eloquence, chiefly of value as containing enlarged views of the duties of a sovereign. Some writers have said, that no panegyric was ever possessed of a finer subject, and on which he might better indulge in all the flow of eloquence, without incurring the suspicion of flattery and falsehood; but others observe, that as it was composed at the very beginning of Trajan's reign, it has but little weight as a testimony to the merits of that excellent emperor. It might perhaps have been the happy means of fixing his character, and it is no small praise if it produced this sort of effect, and that the youthful emperor was determined by a life of virtue to deserve all the encomia paid to him. His epistles, in ten books, are much to be prized for the anecdotes with which they abound, of the characters and incidents of the times, and likewise for the purity and elevation of their moral sentiments, which impress a favourable idea of the writer. They were no doubt intended for the public. Every epistle is a kind of historical sketch, in which we have a view of him in some striking attitude either of active or contemplative life. They strongly mark that love of applause which was unquestionably his ruling passion, and afford some curious facts relative to the modes of feeding a writer's vanity in those times. They exhibit the writer as a professed rhetorician, entertaining and perhaps wearying his friends with long and laboured orations and recitations, commanding constant plaudits by virtue of his rank, his wealth, and his truly estimable qualities; but he was probably in some instances the dupe of adulation. The best editions of Pliny the younger are the Variorum by Veenhufius; and that by Longolius. His epistles have been translated into English by lord Orrery and Mr. Melmoth; the version of the latter is singularly elegant. Pliny contributed largely to the maintenance of a public professor for the instruction of youth in the place of his nativity; assigned an annual revenue for the support of children of both sexes, whose parents had been reduced to poverty; and founded a public library.

PLISA, in *Geography*, a town of Lithuania, in the palatinate of Minsk; 21 miles E. of Minsk.

PLITE of *Loavn*, in our *Old Writers*, seems to be an ancient measure, as a yard or ell, at this time: it is mentioned in the stat. 3 Ed. IV. cap. 5.

PLIVA, in *Geography*, a river of Bosnia, which runs into the Verbas.

PLIUSA, a river of Russia, which runs into the Baltic, between Nerva and Ivangorod.

PLIUSKINA a town of Russia, in the government of Irkutsk; 20 miles N.E. of Verchnei-Udinsk.

PLIVISCHEN, a town of Prussia, in the province of Samland; 28 miles E. of Königsberg.

PLOCAMA, in *Botany*, so named by Dr. Solander, from *πλοκαμοί*, a head of hair, in allusion to its long pendulous

dulous entangled branches.—Ait. Hort. Kew. ed. 1. v. 3. 508. ed. 2. v. 2. 63. Schreb. 797. Willd. Sp. Pl. v. 1. 1210. Mart. Mill. Dict. v. 3.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Rubiaceae*, Juss.

Gen. Ch. *Cal.* Perianth superior, of one leaf, minute, five-toothed, permanent. *Cor.* of one petal, bell-shaped, in five deep oblong segments. *Stam.* Filaments five, short, inserted into the tube; anthers linear, erect, somewhat incumbent. *Pistl.* Germen inferior, globose; style thread-shaped, swelling upwards, longer than the stamens; stigma obtuse, undivided. *Peric.* Berry nearly globose, of three cells. *Seeds* solitary, linear-oblong.

Ess. Ch. Calyx superior, with five teeth. Corolla bell-shaped, five-cleft. Berry of three cells. Seeds solitary.

1. *P. pendula*. Drooping *Plocama*. Ait. n. 1. Willd. n. 1.—Native of the Canary islands, from which country it was sent to Kew by Mr. Masson in 1779; and of the Cape of Good Hope, from whence we have a specimen communicated by Mr. Lambert. It is, or was, kept in the greenhouse at Kew; but no time of flowering being mentioned, the plant is perhaps now lost, without having ever been figured, or fully described. The stem is shrubby, erect, two or three feet high, roundish, smooth, with generally alternate branches, of which the uppermost are extremely numerous, drooping or pendulous, slender, obscurely quadrangular, roughish, leafy. Leaves opposite, on short stalks, linear, acute, entire, very narrow, smooth, somewhat fleshy. *Stipulas* small, acute, between the footstalks, permanent, and at length forming a narrow ring, round each joint of the stem or branch. *Flowers* terminal, axillary, or from the upper forks of the branches, small, on short, simple, roughish stalks, either solitary, or two or three together. *Berry* not half the size of a currant. The whole plant, except the old stem, turns black in drying.

PLOCE, in *Rhetoric*, a figure by which a word is repeated, by way of emphasis; in such manner, as not only to express the subject, but some particular character or property of it.

Cruelty! yes, cruelty beyond all example. His wife's a wife indeed! So Cicero says, Young Cato wants experience, but yet he is Cato.

PLOCKEN-ALBEN, in *Geography*, a mountain of Carinthia; six miles S.E. of Mauten.

PLOCZKO, or PLOZK, a town of the duchy of Warsaw, late of Poland, and capital of a palatinate of the same name in Masovia, situated on an eminence near the Vistula: the see of a bishop, suffragan to the archbishop of Gnesna. It is also the residence of a palatine, a castellan, and a starosta: and contains several churches richly ornamented, one of which is the cathedral. The provost or dean is sovereign of the nobility who reside here, and is accordingly styled prince of that territory. In the castle is a gymnasium or seminary. The provincial court of judicature is held in this town: and a good trade is carried on by its inhabitants; 64 miles W.N.W. of Warsaw. N. lat. 52° 17'. E. long. 19° 35'.

PLOEMUR, a town of France, in the department of the Morbihan; two miles W. of L'Orient.

PLOEN, or PLOX, a town of the duchy of Holstein, which has several times been destroyed by fire; 23 miles N.N.W. of Lubeck. N. lat. 54° 10'. E. long. 10° 22'.

PLOERMEL, a town of France, and principal place of a district, in the department of the Morbihan. The place contains 4512, and the canton 11,800 inhabitants, on a territory of 207½ kilometres, in six communes. N. lat. 47° 40'. W. long. 2° 59'.

PLOESTI, a town of Walachia; 200 miles E. of Belgrade.

PLOEUC, a town of France, in the department of the North Coasts, and chief place of a canton, in the district of St. Brieuc; 10 miles S. of St. Brieuc. The place contains 5073, and the canton 12,800 inhabitants, on a territory of 170 kilometres, in six communes.

PLOGASTEL, a town of France, in the department of Finisterre, and chief place of a canton, in the district of Quimper; seven miles W. of Quimper. The place contains 1047, and the canton 10,809 inhabitants, on a territory of 230 kilometres, in 13 communes.

PLOK-PENIN, in *Commerce*, a term used in the public sales at Amsterdam for a little sum given by the last bidder.

The plok-penin is a kind of earnest, by which it is signified, that the commodity is adjudged to him.

The plok-penin differs according to the quality of the commodity, and the price of the lot. Sometimes it is arbitrary, and depends on the pleasure of the buyer; and, sometimes, it is regulated by the ordinances of the burgo-masters.

PLOMBIERES, in *Geography*, a town of France, in the department of the Vosges, and chief place of a canton, in the district of Remiremont; six miles S.W. of Remiremont. The place contains 1109, and the canton 9947 inhabitants, on a territory of 215 kilometres, in six communes.

PLOMNITZ, a town of Silesia, in the county of Glatz; two miles N.W. of Habelschwerdt.

PLOMO, in *Metallurgy*, a name given by the Spaniards, who have the care of the silver mines, to the ore of that metal, when it is found adhering to the surface of stones, and incrusting their cracks and cavities in the form of small and loose grains of gunpowder. Though these grains be but few in number, and the rest of the stone have no silver in it, yet they are always very happy in meeting with it, as it is a certain token that there is a very rich vein somewhere in the neighbourhood. And if in digging forwards they still meet with these grains, or the plomo in greater quantity, it is a certain sign that they are getting more and more near the good vein.

PLONCOUR, in *Geography*, a town of France, in the department of the Finisterre; eight miles S.W. of Quimper.

PLONE, a river of Pomerania, which runs into the Dammisch see, at Damme.

PLONEVEZ de Faou, a town of France, in the department of the Finisterre; eight miles W. of Carhaix.

PLONGEON, in *Ornithology*. See COLYMBUS.

PLONKETS, in our *Old Writers*, a kind of coarse wool-len cloth. 1 Ric. III. cap. 8.

PLONSK, in *Geography*, a town of the duchy of Warsaw; 22 miles N. of Ploczko.

PLOSAWO, a town of Poland, in the palatinate of Belcz; 28 miles W.S.W. of Belcz.

PLOSS, a town of Germany, in the principality of Culmbach; six miles N.W. of Bayreuth.

PLOT, ROBERT, in *Biography*, a natural philosopher and antiquary, was born, in 1641, at Borden, near Sitting-bourn, in Kent. He was educated at Magdalen Hall, Oxford, where he took his degree of L.L.D. in 1671. Soon after this he became distinguished for his zeal in philosophical and natural science, and was made a fellow of the newly constituted Royal Society, of which learned body he was elected one of the secretaries in 1682. In the following year he was appointed the first keeper of Ashmole's museum at Oxford, and at the same time professor of chemistry in the university. Antiquities were the leading objects of his pursuit, and in 1687 he was made register to the earl marshal's court, and in 1695 the Mowbray-herald extraordinary.

nary. He died in 1696. He is principally known in the literary world by his two county natural histories, which were the first of the kind published in England, and were exemplifications of a great plan which he had formed for a natural history of the whole kingdom. The "Natural History of Oxfordshire" was published first in 1677, and again in 1705, with additions and corrections by Mr. Burman. That of "Staffordshire" was published in 1679, and reprinted in 1686. It was decorated with views of the feats of the nobility and gentry. It is at present extremely scarce. Both these county histories include not only all that properly belongs to the natural history, but whatever relates to arts, manners, and antiquities, and all other memorabilia. As secretary to the Royal Society, he conducted the publication of their Transactions from N<sup>o</sup> 143 to 166 inclusive, and he communicated to it some papers of his own. Since his death two letters of Dr. Plot's have been published relative to antiquities in Kent and Thetford. He left a number of manuscripts, among which were large collections for a natural history of Kent. Biog. Brit.

PLOT, or *Plott*, in *Gardening*. See GRASS-*plat*, &c.

PLOT, in *Dramatic Poetry*, the fable of a tragedy or comedy; or the action represented therein.

PLOT is more particularly used for the knot or intrigue which makes the difficulty and embarrass of a piece.

The unravelling puts an end to the plot.

PLOT, in *Surveying*, the plan or draught of any parcel of ground, *e. gr.* a field, farm, or manor, surveyed with an instrument, and laid down in the proper figure and dimensions. See PLOTTING.

PLOTILE, in *Geography*, a town of Samogitia; 25 miles N.N.W. of Miedniki.

PLOTINOPOLIS, in *Ancient Geography*, a town of Thrace, upon the river Hebrus; 22 miles from Trajanopolis, according to the Itinerary of Antonine.

PLOTINUS, in *Biography*, a Platonic philosopher, was born at Lycopolis, a city of Egypt, in or about the year 204. In very early life he began to shew a great singularity both in taste and manners. He began to study philosophy at about the age of twenty, and for some time he attended the lectures of different famous professors, who then abounded in Alexandria, but he was dissatisfied with all their systems, and attached himself to Ammonius, who attempted to reconcile the different opinions then subsisting among the philosophers, and founded a distinct eclectic school, in which he taught his disciples certain sublime doctrines, and mystical practices, which he communicated to them under a solemn injunction of secrecy. With the instructions of such a preceptor, Plotinus, whose mind had a strong tincture of enthusiasm, was highly delighted, and he told his friend, that he had now met with a tutor in all respects suited to his wishes. Under this master he prosecuted his philosophical studies during eleven years, and became a deep proficient in the abstruse subtleties, and mystical flights of his system. Upon the death of Ammonius, he determined to travel into Persia and India, to learn wisdom of the Magi and Gymnosophists. In this resolution he was encouraged by the example of Apollonius Tyanæus, whose pretensions to the magic arts were said to be derived from these sources. For some time Plotinus considered himself to be under an obligation not to disclose the doctrines which he had learned in the school of Ammonius, in consequence of the injunction of secrecy to which he had submitted, but two of his fellow-pupils having publicly taught the mysteries of their master, he thought himself absolved from his engagement, and became a lecturer in philosophy upon eclectic

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principles. During ten years he confined himself to oral discourse, but at length he found it necessary, as well for the convenience of his pupils, as for himself, to commit the substance of what he delivered to writing. The novelty of his plan of instruction drew after him a crowd of auditors, among whom were persons of high rank of both sexes. To the instructions of those who were willing to become his auditors he devoted himself with the greatest ardour and assiduity. He frequently prepared himself for his sublime contemplations by watching and fasting; hence his enthusiastic passions were sometimes raised to such a pitch, that he believed he was under the immediate protection of a genius, or familiar spirit, of the most eminent order, who was not merely a dæmon, but a god. The superiority which he fancied belonged to his tutelary genius, inflated him with a degree of pride, that bordered upon impiety, or perhaps insanity. He, however, enjoyed so high a reputation for wisdom and integrity, that many private quarrels were referred to his arbitration, and several persons of both sexes, when upon their death beds, sent for him to take upon him the care of their estates, and the guardianship of their children. Such offices he never refused, and he discharged them in a manner that gave the highest satisfaction to the parties concerned. His excellent character secured to him the esteem of many persons of high rank, and particularly of the emperor Gallienus, and his empress Salonina. The romantic turn of his mind was sufficiently shewn, by the use which he made of his interest at court. (See PLATONOPOLIS.) He died in the year 270, when he was in the 66th year of his age. When he found his end approaching, he said to Eustochius, "the divine principle within me is now hastening to unite with that divine being which animates the universe;" expressing by these words a leading principle of his philosophy, that the human soul is an emanation from the divine nature, and will return to the source whence it proceeded. By his disciple and biographer, Porphyry, he is represented as having possessed the power of working miracles: this was probably said with a view of depreciating the Christian religion, of which Porphyry was a great enemy. The treatises of Plotinus, which are fifty-four in number, were distributed by his biographer under six classes, called Euneads. Proclus wrote commentaries upon them. At the request of Cosmo de Medici, Marsilius Ficinus made a Latin version of them, which was first published at Florence, under the title of "Plotini Opera ex interpret. Marsilii Ficini, cum commentariis, necnon Vita Plotini à Porphyrio conscripta 1492." The Greek text was afterwards published at Basil, from a manuscript stated by Lambecci to be in the Imperial library, accompanied with the version of Ficinus in 1580. Dr. Enfield, in his abridgment, &c. of Brucker's Phil., speaking of Plotinus, says "that he made it the main scope and end of his life to dazzle his own mind, and the minds of others, with the meteors of enthusiasm, rather than illuminate them with the clear and steady rays of truth. How much is to be regretted that such a man should have become, in a great degree, the preceptor of the world, and should, by means of his disciples, have every where disseminated a species of false philosophy, which was compounded of superstition, enthusiasm, and imposture. The muddy waters sent forth from this polluted spring, were spread through the most celebrated seats of learning, and were even permitted to mingle with the pure stream of Christian doctrine. Not only at Rome, where Plotinus taught, but first in Alexandria, and afterwards in many of the principalities of Asia Minor, and even at Athens, the ancient seat of wisdom, the system of Am-

monius and Plotinus was embraced and propagated by men, who, in learning and abilities, were greatly superior to its founders." Enfield's Hist. Phil.

**PLOTTING**, among *Surveyors*, the art of describing or laying down on paper, &c. the several angles and lines of a tract of ground surveyed by a theodolite, or the like instrument, and a chain.

In surveying with the plain-table, the plotting is needless; the several angles and distances being laid down on the spot as fast as they are taken.

But in working with the theodolite, semicircle, or circumferentor, the angles are taken in degrees; and the distances in chains and links. So that there remains a subsequent operation, to reduce those numbers into lines; and so to form a draught, plan, or map. The operation is called *plotting*.

Plotting, then, is performed by means of two instruments, the protractor and plotting-scale. By the first, the several angles observed in the field with a theodolite, or the like, and entered down in degrees in the field-book, are protracted on paper in their just quantity.

By the latter, the several distances measured with the chain, and entered down, in like manner, in the field-book, are laid down in their just proportion.

Under the articles **PROTRACTOR** and **PLOTTING-scale**, is found, severally, the use of those respective instruments in the laying down of angles and distances; we shall here give their use conjointly, in the plotting of a field, surveyed either with the circumferentor, or theodolite.

**PLOTTING, Method of, from the circumferentor.** Suppose an inclosure, *e. gr.* A B C D E F G H K (*Plate VI. Surveying, fig. 10.*) to have been surveyed: and the several angles, as taken by a circumferentor in going round the field, and the distances, as measured by a chain, to be found entered in the field-book, as in the following table.

	Deg.	Min.	Cha.	Link.
A	191	00	10	75
B	297	00	6	83
C	216	30	7	82
D	325	00	6	96
E	12	24	9	71
F	324	30	7	54
G	98	30	7	54
H	71	00	7	78
K	161	30	8	22

1. On a paper of the proper dimensions, as L M N O (*Plate VI. Surveying, fig. 11.*) draw a number of parallel and equidistant lines, representing meridians, expressed in dotted lines. Their use is, to direct the position of the protractor; the diameter of which must always be laid either upon one of them, or parallel thereto; the semicircular limb downwards for angles greater than  $180^\circ$ , and upwards for those less than  $180^\circ$ .

The paper being thus prepared, assume a point on some meridian, as A, whereon lay the centre of the protractor, and the diameter along the line. Consult the field-book for the first angle, *i. e.* for the degree cut by the needle at A, which the table gives you  $191^\circ$ .

Now since  $191^\circ$  is more than a semicircle or  $180^\circ$ , the semicircle of the protractor is to be laid downwards; where, keeping it to the point with the protracting pin, make a mark against  $191^\circ$ ; through which mark, from A, draw an indefinite line A b.

The first angle thus protracted, again consult the book for the length of the first line A B. This you find ten

chains 75 links. From a convenient scale therefore, on the plotting-scale, take the extent of 10 chains 75 links between the compasses; and setting one point in A, mark where the other falls in the line A b, which suppose in B: draw, therefore, the full line A B for the first side of the inclosure.

Proceed then to the second angle; and laying the centre of the protractor on the point B, with the diameter as before directed, make a mark, as c, against  $297^\circ$ , the degrees cut at B; and draw the indefinite line B c. On this line, from the plotting-scale, as before, set off the length of your second line, *viz.* 6 chains 83 links; which extending from B to the point C, draw the line B C for the second side.

Proceed now to the third angle or station: lay then the centre of the protractor, as before, on the point C; make a mark, as d, against the number of degrees, cut at C, *viz.*  $216^\circ 30'$ : draw the indefinite line C d, and thereon set off the third distance, *viz.* 7 chains 82 links; which terminating, *e. gr.* at D, draw the full line C D for the third side.

Proceed now to the fourth angle D: and, laying the centre of the protractor over the point D, against  $325^\circ$ , the degree cut by the needle, make a mark e; draw the occult line D e, and thereon set off the distance 6 chains 96 links; which terminating E, draw D E for the fourth line: and proceed to the fifth angle, *viz.* E.

Here the degrees, cut by the needle, being  $12^\circ 24'$  (which is less than a semicircle), the centre of the protractor must be laid on the point E, and the diameter on the meridian, with the semicircular limb turned upwards. In this situation make a mark, as before, against the number of degrees, *viz.*  $12^\circ 24'$ , cut by the needle at E; draw the line E f, on which set off the fifth distance, *viz.* 9 chains 71 links; which extending from E to F, draw the line E F for the fifth side of the inclosure.

After the same manner proceed orderly to the angles F, G, H, and K; then placing the protractor, making marks against the respective degrees, drawing indefinite lines, and setting off the respective distances, as above, you will have the plot of the whole inclosure, A B C, &c. Such is the general method of plotting from this instrument; but it must be observed, that in this process, the stationary lines, *i. e.* the lines in which the circumferentor is placed to take the angles, and in which the chain is run to measure the distances, are, properly, the lines here plotted. When, therefore, in surveying, the stationary lines are at any distance from the fence or boundaries of the field, &c. off-sets are taken, *i. e.* the distance of the fence from the stationary line is measured at each station; and even at intermediate places, if there prove any considerable bends in the fence.

In plotting, therefore, the stationary lines being laid down, as above, the off-sets must be laid down from them; *i. e.* perpendiculars of the proper lengths must be let fall at the proper places from the stationary lines. The extremes of which perpendiculars, being connected by lines, give the plot desired.

If, instead of going round the field, the angles and distances have been all taken from one station, the process of plotting is obvious, from the example above; all here required, being to protract, after the manner already described, the several angles and distances, taken from the same stationary point in the field; from the same point or centre on the paper. The extremities of the lines thus determined, being then connected by lines, will give the plot required.

If the field has been surveyed from two stations, the stationary

tionary lines are to be first plotted, as above; then the angles and distances taken from each to be laid down from each respectively.

**PLOTTING, Method of,** where the angles are taken by the theodolite, i. e. by back-sight and fore-sight (as it is called) is somewhat different. To prepare the angles for plotting, the quantity of each must first be found, by subtracting the degrees of the fore-sight and back-sight from each other: the remainder is then the angle to be protracted. The use of parallel lines is here excluded; and instead of laying the protractor constantly on, or parallel to meridians, its direction is varied at every angle. The practice is thus:

Suppose the former inclosure to have been surveyed with the theodolite, after the manner of back-sight and fore-sight; and suppose the quantity of each angle to be found by subtraction.

An indefinite line is drawn at random, as A K, (fig. 11.) and on this the measured distance, e. gr. 8 chains 22 links, is set off, as in the former example: if now the quantity of the angle A have been found  $140^{\circ}$ , the diameter of the protractor is to be laid on the line A K, with the centre over A; and against the number of degrees, viz.  $140$ , a mark made, an indeterminate line drawn through it, and the distance of the line A B laid down from the scale upon it.

Thus we gain the point B; upon which laying the centre of the protractor, the diameter along the line A B, the angle B is protracted, by making a mark against its number of degrees, drawing an occult line, and setting off the distance B C, as before.

Then proceed to C, laying the diameter of the protractor on B C, the centre on C protracts the angle C, and draw the line C D: thus, proceeding orderly to all the angles and sides, you will have the plot of the whole inclosure A B C, &c. as before.

**PLOTTING-Scale,** a mathematical instrument usually of box-wood, sometimes of brass, ivory, or silver, and either a foot, or half a foot long, and about an inch and a half broad.

It is denominated from its use in plotting of grounds, &c.

On one side of the instrument (represented *Plate VI. Surveying, fig. 12.*) are seven several scales or lines, divided into equal parts. The first division of the first scale is subdivided into ten equal parts, to which is prefixed the number 10, signifying that ten of those subdivisions make an inch; or that the divisions of that scale are decimals of inches.

The first division of the second scale is likewise subdivided into 10, to which is prefixed the number 16, denoting that sixteen of those subdivisions make an inch. The first division of the third scale is subdivided in like manner into 10, to which is prefixed the number 20. To that of the fourth scale is prefixed the number 24; to that of the fifth, 30; that of the sixth, 40; and that of the seventh, 48; denoting the number of subdivisions equal to an inch, in each, respectively.

The two last scales are broken off before the end, to give room for two lines of chords, marked by the letters C C.

On the back-side of the instrument is a diagonal scale, the first of whose divisions, which is an inch long, if the scale be a foot, and half an inch, if half a foot, is subdivided, diagonally, into 100 equal parts; and at the other end of the scale is another diagonal subdivision, of half the length of the former, into the same number of parts, viz. 100.

Next the scales, is a line divided into hundredth parts of a

foot, numbered 10, 20, 30, &c. and a line of inches subdivided into tenths, marked 1, 2, 3, &c.

**PLOTTING-Scale, Use of the.** 1. Any distance being measured by the chain, to lay it down on the paper.—Suppose the distance to be 6 chains 50 links. Draw an indefinite line; set one foot of the compasses at figure 6 on the scale, e. gr. the scale of 20 in an inch, and extend the other to five of the subdivisions, for the 50 links: this distance being transferred to the line, will exhibit the 6 chains 50 links, required.

If it be desired to have 6 chains 50 links, take up more or less space, take them off from a greater or lesser scale, i. e. from a scale that has more or fewer divisions in an inch.

To find the chains and links contained in a right line, as that just drawn, according to any scale, e. gr. that of 20 in an inch. Take the length of the line in the compasses, and applying it to the given scale, you will find it extend from the number 6 of the great divisions to five of the small ones; hence the given line contains 6 chains 50 links.

**PLOTTING-Table,** in *Surveying*, is used for a plain table, as improved by Mr. Beighton, who has obviated a good many inconveniences attending the use of the common plain table. See *Phil. Trans. N<sup>o</sup> 461. sect. 1.*

**PLOTTNITZ,** in *Geography*, a lake of Silesia, in the principality of Oels; four miles E. of Militsch.—Also, a town of Silesia, in the principality of Neisse; three miles W. of Patschkau.

**PLOTUS, the Darter,** in *Ornithology*, a genus of birds of the order Anseres. The generic character is, bill straight, pointed, toothed; the nostrils have a slit near the base; face and chin naked; legs short; all the toes are connected. The birds of this genus, of which there are three species, have a small head, and long slender neck; they are chiefly seen in southern climates; they live chiefly on fish, which they take by darting forwards the head while the neck is contracted like the body of a serpent.

#### Species.

**ANHINGA; White-bellied Darter.** The head is smooth, and the belly white. It inhabits Brasil, and is about 34 inches long. It builds on trees, and is hardly ever seen on the ground; when at rest it sits with the neck drawn in between the shoulders. The flesh, though sometimes eaten, is reckoned rancid and oily. The bill is cinereous, yellowish at the base; irids golden; head, neck, and breast reddish-grey; body above black, the scapular feathers with a white spot in the middle; it has 12 tail-feathers, which are broad and long; its legs are of a yellowish ash colour.

**MELANOGASTER; Black-bellied Darter.** Head smooth; belly black. It is about three feet long, and found in Ceylon and Java. There are three varieties of this species. 1. Above brown, beneath black; streaks on the scapulars and oval spots on the wing-coverts white. Between the breast and belly is a rufous band. It is a native of Cayenne. 2. Black; back and scapulars spotted with white; wing-coverts yellowish-white; tail rufous at the tip. 3. Black; head, neck, and wing-coverts streaked with rufous and brown. It is found at Senegal.

**SURINAMENSIS; Surinam Darter.** Head crested; belly white. Found, as its name imports, in Surinam; is about 13 inches long, and is domesticated. It feeds on fish and insects, especially flies, which it catches with great dexterity.

**PLOTZKAU,** in *Geography*, a town of Germany, in the duchy of Anhalt-Bernburg; five miles S.S.W. of Bernburg.

**PLOUAGAT,** a town of France, in the department of

of the North Coasts, and chief place of a canton, in the district of Guingamp. The place contains 2034, and the canton 7239 inhabitants, on a territory of 172½ kilometres, in seven communes.

PLOUARET, a town of France, in the department of the North Coasts, and chief place of a canton, in the district of Lannion. The place contains 4276, and the canton 14,092 inhabitants, on a territory of 260 kilometres, in eight communes.

PLOUAY, a town of France, in the department of the Morbihan, and chief place of a canton, in the district of L'Orient; seven miles N. of Hennebon. The place contains 3586, and the canton 12,304 inhabitants, on a territory of 215 kilometres, in seven communes.

PLOUBALAY, a town of France, in the department of the North Coasts, and chief place of a canton, in the district of Dinan; nine miles N. of Dinan. The place contains 1385, and the canton 6008 inhabitants, on a territory of 92½ kilometres, in eight communes.

PLOUDALMAZEAU, a town of France, in the department of the Finistère, and chief place of a canton, in the district of Brest; 10 miles N.N.W. of Brest. The place contains 2899, and the canton 14,588 inhabitants, on a territory of 177½ kilometres, in 12 communes.

PLOUDERY, a town of France, in the department of the Finistère, and chief place of a canton, in the district of Brest; five miles E.N.E. of Landerneau.

PLOVER, ASIATIC, in *Ornithology*. See CHARADRIUS *Asiaticus*.

PLOVER, *Bastard*. See TRINGA *Vanellus*, and LEAPWING.

PLOVER, *Black-crowned*. See CHARADRIUS *Atricapillus*.

PLOVER, *Black-headed*. See CHARADRIUS *Melanoccephalus*.

PLOVER, *Coromandel*. See CHARADRIUS *Coromandelicus*.

PLOVER, *Cream-coloured*. See CHARADRIUS *Gallicus*.

PLOVER, *Dusky*. See CHARADRIUS *Obscurus*.

PLOVER, *Fulvous*. See CHARADRIUS *Fulvus*.

PLOVER, *Golden, or Green, pluvialis*, the *charadrius pluvialis* of Linnæus: an elegant species, which is often found on our moors and heaths, in the winter time, in small flocks.

PLOVER, *Gregarious*. See CHARADRIUS *Gregarius*.

PLOVER, *Grey*. See TRINGA *Squatarola*.

PLOVER, *Hooded*. See CHARADRIUS *Pileatus*.

PLOVER, *Lesser, or Dotterel*. See CHARADRIUS *Morinellus*.

PLOVER, *Long-legged*. See CHARADRIUS.

PLOVER, *Mongolian*. See CHARADRIUS *Mongolus*.

PLOVER, *Noisy, or Chattering*. See CHARADRIUS *Vociferus*.

PLOVER, *Norfolk, or Greater, or Stone curlew*. See CHARADRIUS.

PLOVER, *Red-necked*. See CHARADRIUS *Rubicollis*.

PLOVER, *Ringed, or SAILLARK*. See CHARADRIUS *Hiaticula*.

PLOVER, *Ruddy*. See CHARADRIUS *Rubidus*.

PLOVER, *Spotted, or Alwargrim*. See CHARADRIUS *Apricarius*.

PLOVER, *Spur-winged*. See CHARADRIUS *Spinosus*.

PLOVER-*Stone*, a name used in some parts of England for the *godwit*, or *egocephalus* of authors.

PLOVER, *Wattled*. See CHARADRIUS *Bilobus*.

PLOVER, *White-bellied*. See CHARADRIUS *Leucogaster*.

PLOVER, *Wreathed*. See CHARADRIUS *Coronatus*.

PLOVER, *New Zealand*. See CHARADRIUS *Novæ Seelandiæ*.

PLOUESCAT, in *Geography*, a town of France, in the department of the Finistère, and chief place of a canton, in the district of Morlaix. The place contains 2138, and the canton 9648 inhabitants, on a territory of 125 kilometres, in five communes.

PLOUGH, in *Agriculture*, a well-known implement for breaking up the ground for tillage crops. It was invented at a very early period, being, perhaps, nearly coeval with the cultivation of the soil itself, as, without some kind of a plough, no produce of any consequence could possibly have been derived from the ground. It is an implement which was well known to the Egyptians, the Greeks, and the Romans, and which has prevailed in most of the Eastern countries for a vast number of ages.

These tools are constructed in different ways, according to the particular uses to which they are to be applied, and the nature of the land on which they are to be employed; as it is obvious that no one sort of plough can be made use of in all cases with equal success: differences in the nature of the soils, situations, and methods of performing the work, must necessarily require a diversity in their forms and modes of construction. Some of the more common and less complex kinds may, however, be very generally applied in the cultivation of land, and, of course, are the most useful on most sorts of arable farms. It is remarked in the Essex corrected report on agriculture, that "there is scarcely a circumstance in the agriculture of the kingdom more surprising, after so general attention has been paid to it, than the extreme uncertainty in which the true structure of the plough yet remains. That variations for different soils and circumstances must and ought to occur, is admitted; but one plough for one specific object might have been produced, its superiority to others ascertained, and the principles in its construction, on which such merit depended, fully developed, and laid down in accurate drawings; yet this has not been done; and the only approximation to it, it is contended, in a paper by the late Mr. Arbuthnot, which the writer published near forty years ago in his 'Eastern Tour.' Farming mechanics, it is supposed, look to the Board of Agriculture for supplying this great deficiency, which can be supplied only by a series of experiments, demanding a considerable expence, and more attention."

Ploughs may, with propriety, be divided into the *swing* and *wheel* kinds, the former being such as are wholly destitute of any sort of machinery that can produce resistance in the way of friction about the end of the beam. Those are of course the lightest of draught, but require the experience of a good ploughman in using them. But these sorts of ploughs vary much in different parts of the kingdom. When well made they are, however, very effective, and capable of being generally employed in the ploughing of the lighter sorts of land. And they have other advantages, which are those of not being so readily put out of order, and of affording less fatigue to the teams employed in drawing them.

Those of the latter sort are such as have the complex apparatus of wheels applied to them in some way or other, though they differ exceedingly in the manner in which this is done. From the steady manner in which these ploughs mostly proceed in their work, they are evidently capable of being managed by much less experienced ploughmen. It is suggested in the Middlesex Report, that wheels seem to have been added to ploughs in consequence of the want of expertness in the workmen; and that in all sorts of land, but especially in that of the stony and more stiff kind, they afford

afford much assistance, by enabling them to execute the work with greater regularity in the depth, and more evenness in the surface. But from the nature of the machinery with which they are loaded, they are evidently more expensive in their construction, more liable to be put out of order, and from the friction that is thus produced require more strength in the teams that are employed in drawing them. Besides, they have the disadvantage of being more apt to be put out of order in their course, by the occurrence of stones, clods, and other surface inequalities, than those of the former kind. An inconvenience attending these ploughs is also noticed by lord Somerville in the Communications to the Board of Agriculture, which is, that with *wheel-ploughs* workmen are apt to set the points of their shares too low, so as by their inclined direction to occasion a heavy pressure on the wheel which must proceed horizontally. Of course he conceives the effect of this struggle to be an increased weight of draught infinitely beyond what could be imagined, on which account he thinks that the wheel is to be considered as of no consequence in *setting a plough for work*; but that passing lightly over the surface it will be of material use in breaking old lays, or lands where flints, rocks, or the roots of trees are present, and in correcting the depression of the share from any sudden obstruction, as also in bringing it quickly into work again, when thrown out towards the surface. It is however believed on the whole, by the writer of the report just mentioned, that in comparing two extensive districts, one of which is managed with wheel-ploughs, and the other with those of the swing kind, taking every description of ploughmen that are met with in them, the wheel-ploughs will be found to have the advantage in point of neatness of work.

But the great weight of the carriage parts for the wheels, and the time and trouble which they require in adjusting and fixing them, are great objections to the use of this sort of plough in most cases, and particularly for the general purposes of husbandry.

Therefore, in the forming of all sorts of ploughs, the less they are encumbered with machinery of the wheel or other kinds, the more *useful they will probably be found*.

All around Kelvedon, in the county of Essex, it is stated in the agricultural survey of that district, that they make use of both swing or foot, and wheel-ploughs, and that it is much disputed which is preferable. In favour of the swing-plough, it is contended that it is better calculated for fallowing, as the soil can be broken up to a greater depth, and it does not rise at the headlands, which is the case with the wheel-plough; the ends of the furrows being shallower, from the wheels, as soon as they get upon the headlands, throwing the share up. The swing, or foot-plough, is easier of draught, the prime cost is less, and it is kept in repair at a smaller expense.

The wheel-plough, on the other hand, keeps a more regular depth, and will turn a shallower furrow, when the fallows are put upon the ridge, or formed into ridges; the work can be done with more regularity, the wheels being put out to the exact width at which furrows are to be made; this is of material consequence. And further, wheel-ploughs about the above place, can be worked when swing ones will choke on stubbles, and they are varied in *pitch* with more exactness, as well as go deeper than the others; but swing-ploughs are better, if the land be at all wet.

It may be noticed, however, that when the men are accustomed to ridge-ploughing, they will do it as well with the swing or foot-plough as with the wheel, but they cannot block up hard land in the summer so well with it.

And in respect to the depth of this sort of work, some contend that very deep ploughing can hardly be effected without the assistance of wheels to the ploughs. Besides, if the land is to be broken up for fallow late in the spring, and the soil comes up in large blocks, which is sometimes the case in wet land and late fallowing, the swing, or foot-plough, is apt to be thrown out of the furrow, and does not perform its work so well as the wheel-plough.

It is found a matter of great importance in the construction of the swing-plough, that the beam should have the length of about six feet, or six feet and a half. The rule or reason for which, according to Mr. Arbuthnot, is that the line of traction from the tug at the horse's shoulder to the centre of gravity and resistance, is a little behind the point of the share.

In the Rural Economy of Yorkshire, after noticing the similarity of the principles that are requisite in the construction of the ship and the plough, and considering the difficulty of fixing and reducing them to a regular theory, as nearly the same, it is observed, that the art of construction in either case is principally attained by practice. In this district, says the writer, the ploughs of different makers pass through the soil, with various degrees of facility and execution; nevertheless, though he has paid some attention to the different makes, he finds himself entirely incapable of laying down such particular rules of construction as would do his country any service, or his work any credit. Even the general principles of construction he must mention with diffidence.

The great difficulty in the construction of a plough is that of adapting it to all soils, in all seasons, and to all depths. If the soil break up in whole furrows, every inch of depth requires, in strictness, a separate plough, or a separate regulation. Here rests the main objection to the winding mould-board, which admits no regulation in respect of depth. If the semi-arch, or hollow of the hind part of the mould-board, be raised sufficiently high to turn a thick furrow completely, it is of no use in turning a thin one. On the contrary, if it be brought down sufficiently low to turn a shallow furrow properly, it is impossible to turn a deep one with it in a workman-like manner. There is not room for it within the hollow, or semi-archway of the mould-board. The inevitable effect of this is, either the furrow is forced away wholly by the upper edge of the mould-board, and set on edge; or the mould-board rides upon the furrow, raising the heel of the plough from the ground, the bad effects of which need not be explained. An upright stern, with a moveable heel-plate to turn the furrow at any given depth, is, in this point of view, much preferable to a hollow mould-board; and if its use in raising a cleft of mould, for the purpose of covering the seed, be added, its preference is still more conspicuous. But some of these inconveniences have been obviated by the invention of moveable mould-plates, as will be seen afterwards.

Yet in the construction of all sorts of ploughs, there are, notwithstanding, a few points or circumstances that ought to be particularly, and in all cases attended to; such as the following: that part which perforates the soil, and breaks it up, and which is usually termed the *throat* or *breast*, should have that sort of clean, tapering, sharpened form, that is introduced with the greatest readiness, and which affords the smallest resistance in its passage through the ground. According to some, this part should be long and narrow, making an acute angle with the beam, as the length of the breast is supposed to have a tendency to preserve the *flag* from being broken, on account of the surface for its support being longer; which is a circumstance of consequence in the ploughing

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ploughing of old lays for wheat, pease, and other similar crops; as, by such means, the growth of weeds through the broken ground is prevented. And the resistance of the earth against the breast is likewise lessened, in proportion to the acute angularity of that part against the beam of the plough. The mould-board should also have that sort of curved, twisted, or hollowed-out form, which is best calculated to lessen resistance, and at the same time give the furrow-slice the proper turn. And the beam and muzzle of these implements should likewise have such a construction, as that the team or moving power may be attached in the best and most suitable *line of draught*, as this is a circumstance of great importance, when several animals are made use of together, that the draught of the whole may coincide in the most perfect manner, and with the utmost exactness.

Likewise, in the construction of every sort of plough, much regard should be paid to the weight, so that they may have sufficient strength for the purpose, without being unnecessarily heavy. Much may be done in this intention, by lessening the quantity of wood in those parts where there is no particular stress, while it is retained so as to have full power in the others. This has been much less attended to in the making of ploughs than its importance would seem to demand.

It is noticed in the Agricultural Survey of the County of Essex, that the *throat* at the fore end or neb of the plate or breast in the Norfolk, and most other ploughs, with the exception of the Rotherham, rises from the upper surface of the share too perpendicularly, and too much at right angles to the line of friction, or pressure of the earth the plate has constantly to act against: working thus abruptly in the ground, the slice or furrow is violently torn, or burst from off the ground hand, broken and imperfectly turned over, instead of being gradually cut, raised whole, and whelmed over; as will always be the case, when the plough enters the ground obliquely, and at a proper angle; and that the plate or mould board is properly turned for raising up, and turning the slice completely over.

It is a clear position, proved by experiment, that a semi-ellipsis is the true form of throat which is necessary in ploughs, which is the part or space from the share point to the junction or approach of the breast to the beam: and that there is found a remarkable variation in the form of the *breasts*, or mould-boards of the ploughs throughout the northern parts of the same district, and which is chiefly in the degree of concavity or convexity. Some wheel-wrights and farmers prefer a form rather concave, a flatness in the fore part, which joins the share, and which gradually fills up as the sweep recedes; others like it neither concave nor convex; and there are many ploughs in which the convexity is extremely great.

The great length of the breast, in some ploughs, is a circumstance which gives steadiness to the implements; but, at the same time, it is probably the means of increasing the draught to the horses in a great degree.

The shortness of the breast, if the curve or sweep be in perfection, or wears equally every where, may lessen friction, and certainly does, if the earth be loose; but it probably may not have the same effect in the first earth, upon a stiff layer. It is, however, a pretty general opinion, that it lessens it in all cases.

A great variety of breasts, of different forms and constructions, are represented in the plates upon ploughs, in the Agricultural Survey already referred to, which are well worth consulting by the inquirer on this subject; and in the ploughs which are given here, there is also a very great di-

versity in the shape of the same part, as will be seen by attending to the figures of the different plates.

Some cultivators in this district use a breast which is very convex, and contend that such a degree of roundness and fullness in the bosom is necessary on heavy lands; also, that the soil sticks adhesively to the plough, if it be not thus rounded all the way; as well as that it turns the furrow better.

On the great variety of the breasts of ploughs, which appear in the plates of the above Survey, all of which are more or less distinct and different from each other, it is observed that they will all, on certain soils, and moments or times of tillage, make very good work; but it does not hence follow, that the form is a matter of indifference: such a conclusion would be very erroneous. There is a considerable difference between a breast passing freely through the soil without loading, and driving the earth before it, or pressing it after the furrow is turned, and another that has either of those faults, not visible perhaps in the work when finished, but to the great fatigue of the horses. In the construction of the plough, as has been already seen, there is not a point of more importance.

One of the most extraordinary circumstances in these breasts is, that of their all, with the exception of one, having more or less convexity, and in many, as has been seen, to a very extraordinary degree, especially in those about Birchholt and South-End. But in that furnished by his excellency Mr. Jefferson, the late president of the United States of America, and which was sent to the Board of Agriculture, and first tried by C. C. Western, esq., at Felix Hall in this district, the formation was made on the idea, that as the bottom cut of the furrow is, or ought to be, perfectly *flat*, the breast, which comes in direct contact with it, should be flat also; so that there should be no disposition in the mould to sink into any depression or concavity of the breast; nor any projection from a right line in the breast, to press or force into the furrow-slice, as it is turning. The idea is new and excellent: but what, on such principles, can be said to the convexity in some instances, the shape in the breasts of which must constantly have a tendency to *groove* that furrow-slice, from pressing in the centre. It should seem as if this must, on every principle, be erroneous. The retaining of it, in the case of Mr. Duckett's plough, is supposed, more apparently than really, an exception, in consequence of the soil he had to work on, as it was invented for a very loose sand only; and on such a soil the straight breast is much more admissible than on any other. This plough was seen at work on his farm many years ago, and it made excellent work: the convex *addition* to the flat surface, on the lower part, was probably made to divide the weight of the moving sand, and to keep enough of it in a due degree of elevation.

The objection to so much concavity or flatness in the fore part of the breast, as appears in that supplied by the American president, is that of the loose earth of the furrow *loading* there, which in some cases it is very apt to do.

Another point in which the ploughs here, as well as in other places, seem to be deficient, is in the height of the breast from the ground: they are, for the most part, too low behind; they should be, therefore, somewhat raised in this respect. In turning over a furrow of loose mould with rolling clods, the hind corner of the breast should be high enough to sweep them over, but without pressure.

In the next place, that part which is called the plough-heel may be examined, which comprises the position of the breast behind, and forms, together with the end of the *rest*, that wedge which fills up the furrow. There are two principal

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incipal questions, it is supposed in this district, in relation to the form of it:—What ought to be the breadth at bottom, or, more properly speaking, the heel? and, what should be the breadth at top? Some think the heel should not be more than seven inches wide at bottom, which is the common width in some places. In examining the ploughs, in some cases, it appears that the breast closes at the heel gradually, being a termination of that convexity of breast, of which so many farmers in this district are fond. Improvements have been made, in which this narrowness at the heel has been retained, without the convexity *before*, and but slightly behind. Some ploughs are found to be faulty at the top of the breast behind: it overhangs the furrow too much, and seems to the eye to be in a position to *press*.

In concluding the subject, it is remarked, that when the ploughs in a single county can vary so much in the breast, or earth-board, and that in a district, too, not at all remarkable for diversity of soil, which might call for considerable variations, it must afford a strong proof how very undetermined the true mechanism of this most necessary of all tools still continues to be. And this, it is contended, ought to excite the endeavours of every scientific farmer to multiply experiments, to reduce the construction to plain and fixed principles.

In regard to the *pitch* of ploughs, it is noticed, that in the operation of working wheel-ploughs with improperly turned plates, or mould-boards, it will frequently happen, from the resistance produced against the plough by stones, the tenacity or compression of the earth, that they are obliged to be let down below the corresponding line of level, so materially necessary to the equal bearing between the pitch of the plough, and to the inclination which is thus given to the point of the share downwards, and which ought always to be, as nearly as possible, in a line drawn parallel to that of the draught, and with the breast-work, which forms the fulcrum for the beam to rest on. When a plough is so constructed, and set to work, that it bears unequally in these points, the end of the share will be rooting or digging with its point downwards, kicking up and sideways at the heel, and rendering it utterly impossible to plough the ground clean, or in anywise to lay the work uniform, or even in a tolerable manner; notwithstanding an excessive and unnecessary degree of labour is thereby produced to the ploughman and horses. This description is not so very clear, but there can be no doubt that not going close at the heel is a very common fault in wheel-ploughs, and often seen in Norfolk, as well as in other counties, in cases in the former, which have not the least reference to the breast; and it is a just observation, that the horses suffer much by it. The draught-chain in some ploughs, which draws by the hammer, between the coulter and the tuck, is not so parallel with the horizon as it would be, were it thrown more backward, which is the case in other tools of this kind, and forms a much better position.

In each of the above descriptions of ploughs there are several varieties in common use in different districts of the kingdom; but it is only necessary here to describe such as have been found to answer in the most perfect manner in practice.

In the *swinging* sort, those most in use are the *Rotherham* plough, which is a light useful plough for all the less heavy sorts of soil, and which, probably from its neat simple construction, is in more general use than any other, especially in all the more northern districts of the kingdom. It has certainly much superiority where one plough is only required, and where the advantageous and economical method of performing the work with one man and two horses without a driver is had recourse to. It is in much estimation in all the

West Riding of Yorkshire, and is said in the Survey of that district to have been invented by Mr. Joseph Foljambe, of Eastwood, about seventy years ago. As constructed in that part of the island, the dimensions are as follow:

	Feet.	Inch.	
From the end of stilt on land-side to the point of the share	7	4	}
From the end of beam where inserted into it to ditto, of ditto	3	0	
Length of beam	6	0	
Width of the head in the widest upper part	1	4	}
Ditto of ditto at lowest part	0	9	
Ditto of share behind the wing	0	3½	
Length of surface on which the plough touches the ground	2	10½	
Height from ground to top of beam where coulter goes through	1	8	
Width between stilts at the end	2	6	
Height of ditto from the ground	1	11	
Weight of wood and iron work, about	1¾ cwt.		

And it has also a copse rack, or hook with teeth, to admit of more land being given to the plough, or the contrary, which is particularly useful in many cases.

It is noticed, that with a few trifling alterations it is made use of over the whole district, and from that being often called the *Dutch* plough, it is supposed to have been originally brought from Holland by the inventor.

But since its introduction it has received various improvements by different cultivators. In Mr. Bailey's attempts upon it, the mould-board, which is of cast-iron, is so formed, that the sod to be raised presses equally against it, in every part, from the sock point to the place where it leaves it; and it varies from other mould-boards, in not beginning to take its rise from the bottom of the heel, but at least twelve inches farther forward towards the sock, and in being cut away at the bottom opposite the heel, about three inches high, from the sole, by which the turning of the sod or furrow-slice is said to be much facilitated. Thus improved, these ploughs have been found to answer perfectly in different trials, and have been allowed by those who have seen them at work to go with more ease to the teams than those of any other construction.

And it has been supposed that the beam, from its crooked form, which is obvious in some of its improvements, by being fixed so low down in the part next to the handles, makes the plough require less force, and to go in a more sliding manner. And that from the fore end of the beam being so much higher than the hinder part, the holder of the plough has more power, as the draught does not oppose so much resistance to him; for if the beam were fixed to the handles much higher, as is usually the case in other ploughs, this plough would be constantly rippling on the point, and in that way increase the weight of draught. And where it meets with any resistance, such as a stone, it is liable to rise up, while in this form it proceeds in a sliding manner, which affords a steadier motion, and renders it more easily held. Besides, it is much stronger; as in the part where the left handle and the beam are joined, underneath the mortise where the tenon of the beam, by which the bearing of the ploughman on the handles does not in the least affect that part, which in other ploughs is the weakest. In this improvement of the Rotherham plough, the mould-board is so constructed at the breast as to have a slight degree of convexity, instead of being concave, as is often the case,

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by which the furrow-slice is supposed to be prevented from slipping down; and by the keeping the lower part from the ground, when it comes to the turn of the breast, it falls off; consequently, as the furrow-slice has rested on or by the side of the breast, when the plough has advanced twelve inches the work is finished. By this improvement it is supposed that the plough will turn a furrow of any extent, from four to eighteen inches, where requisite, and the same in depth; as the plough that will produce a wide furrow and turn it well, is capable of ploughing deep: the convexity of the breast also causes it to clean itself better, which is a desirable property, as it is thereby rendered less heavy, and less resistance afforded by one portion of earth being prevented from rubbing upon another, and at the same time the work performed in a more perfect manner. The coulter has likewise a position so as to cut in a slanting manner, which causes any resistance to rise up more expeditiously, and the land to be opened with more facility than where it has a more perpendicular direction.

It may be noticed, that where this improved plough is employed with more than two horses abreast, the additional ones must be put before the pair, as it has not land enough to follow single horses.

Thus improved, it has the excellent property of being small and light, while it is sufficiently strong to resist any power that may be applied to it. It is capable of ploughing any sort of land, and in larger proportion than any other except the Norfolk and Suffolk ploughs. The chief improvements which have been effected in the form of this plough, are stated to be in the breast, and in fixing the beam to the handles or stilt. There is also a cock, or a sort of crank, fixed by a screw and nut, so as to keep the share in its proper situation when the plough is drawn backwards.

A representation of an improved plough of this kind may be seen in *Plate XXX. Agriculture, on Swing-ploughs, at fig. 1.*

Wheels have sometimes been added to these ploughs as a sort of improvement for particular purposes; and with either one or two fixed near the points of the beams, without any carriage parts, they have been found to pass through the soil in a very light, easy, and steady manner, and where there are two wheels, to require no holder in many cases, except in setting in turning out of the work at the ends of the ridges. As swing-ploughs, they are probably, however, capable of the most general application.

The *Northumberland* or *Cumberland* plough is an improved plough of this nature, which is held in very high estimation in most of the northern districts, and which performs its work in a very excellent manner, being light, and of little draught. It ought to be much more generally employed than is at present the case on most kinds of soil.

*Small's Chain* plough is another plough of the swing kind, that is a very useful implement, and capable of very extensive application. It has its name from that of the inventor, who constructed it about forty years ago. It is neatly formed, and very light in its appearance, but at the same time, from the addition of the chain, possessing great strength. It is, therefore, capable of being employed in strong rough sorts of soil, where other sorts of ploughs are liable to be destroyed, as when the share, or even the coulter, in this implement, meets with any sudden impediment or obstructing cause, the stress is immediately thrown upon the chain instead of the beam. The sock is also formed with a fin or feather, by which the firm earth in the bottom of the furrow is cut and moved more readily, and in a more complete manner than could be done by the sock in the common plough. In this plough the mould-board is mostly

made of cast-iron, having a gentle curve, by which the furrow-slice is thrown off with the least possible resistance. It is supposed by Mr. Donaldson to be on the whole one of the best constructed swing-ploughs for all sorts of soils, in a proper state of cultivation, in common use in the island. It is capable of ploughing, with one man and two horses yoked abreast without any driver, more than an acre a day with the greatest ease. An improved plough of this sort is shewn at *fig. 2*, in the same plate on swing-ploughs.

The *Somerville* plough is also an improved plough of the same sort, in which the throat has a more clean sharpened form, and the mould-board is rendered moveable in the manner that will be noticed in speaking of the *Double Furrow* plough. It is capable of being made use of with advantage in breaking up deep stiff soils, as from the moveable nature of the extreme part of the mould-board the furrow-slice can be laid more or less flat, according to the particular circumstances of the case. It is consequently capable of a pretty general use in most sorts of soils.

This sort of improved plough is represented at *fig. 3*, in the same plate on different kinds of swing-ploughs.

The *Suffolk Iron Swing-plough* is another plough of this class, which is found useful in different cases. It was, according to the author of the Agricultural Report of Suffolk, improved by an ingenious blacksmith in that district of the name of Brand, and made wholly of iron. It has been found to answer well in practice, in such lands as are of a strong heavy tenacious quality, and where much obstruction is afforded by the roots and fibres of different sorts of plants and vegetable productions. Its useful properties have been fully experienced in breaking up strong heavy rooty lands on his majesty's farm in the Great Park at Windsor, according to the author of the Agricultural Survey of Berkshire, as it performs its work not only with more facility, but in a better manner than most of those ploughs that are made use of in such descriptions of land. The cops by which it is drawn are said to have been constructed by Mr. Brand, and are extremely well contrived for the purpose.

An improved plough of this description is seen at *fig. 4*, in the plate on swing-ploughs.

*Ducket's Skim-coulter* plough is another very useful implement of this sort, which is capable of being employed with great advantage where the surface is coarse or grassy, in order to bury it to such a depth as may prevent any inconvenience from its rising to injure the crops that may be sown upon such lands. The principle upon which this plough operates is extremely simple, and of course of a very useful nature, being merely taken from that of trenching ground in the practice of gardening, or that of depositing the surface spit of earth in the bottom of the preceding furrow, and placing the second, or that taken from below, upon it, by which means it is evident that that which was first turned down remains in a state of decay, without any risk being incurred of the grassy material rising so as to produce inconvenience in the operations that may be going on upon the surface. It is capable of performing its work to a considerable depth, where the soils are sufficiently deep for the purpose.

And it has been remarked by lord Somerville, in a little tract on ploughs and oxen, that the skim requires a perpendicular direction, and that the coulter-hole should be removed further from the throat and share, as in the common position it would choak when in work.

By this sort of plough the ground may be opened to any depth in separate horizontal portions of earth; and as the weeds or grassy surface are turned down in the first operation, and covered by fresh earth or mould from beneath,  
a larger

a larger proportion of nourishment is supposed to be provided for the crop, while at the same time it is rendered more clean, and the inconvenience of the roots of the grasses or other plants wholly got rid of. It requires a strong team in the heavier sorts of soil, but this is in some degree counterbalanced by the circumstance of one such ploughing being mostly sufficient for the crop. It is consequently evident, considering the number of ploughings generally given in the ordinary way of preparing lands for a crop of barley or turnips, and under the following system for wheat, and the labour and expence in the latter case, in raking, picking, and burning weeds, that the advantages of this plough are probably greater than are generally supposed. It has also advantages in another point of view, which are, that the soil is increased in depth, and the parts of it loosened and broken down, that the fibrous roots of the crops strike and extend themselves more readily in it, and of course are better fed and supported. The noble writer just mentioned thinks, that in thin and sandy soils it is more particularly useful, because it cuts off all which is on the surface, at the depth of an inch, or an inch and a half, in order to its being laid in a state of decay for a future crop, by which an increased depth of soil is given to every subsequent course of crops, and which often acts as a pan or support, to keep up manures in circulation, as their running through such soils too quickly is considered a great misfortune and disadvantage in such soils.

A figure of this valuable implement is given in the plate on *swing-ploughs*, at *fig. 5*.

Besides, it is also capable of being made use of without the skim-coulter as a common plough. When well made, it costs from three to five pounds.

And there is a sort of plough of this nature which has a double share, the one being fixed directly over the other. It is made use of in some of the southern districts with advantage, in putting in one crop immediately after another, as by it a narrow shallow furrow is removed from the surface, and another from below placed upon it, to such depth as may be thought most proper, it being capable of acting to ten inches or more. In this manner many sorts of crops, such as rye and other green crops that have much height of stem, may be turned down without any inconvenience of any of the parts sticking out through the seams of the furrow-slices, by which the farmer has a clean surface of mould for the reception of the grain.

Another plough of this sort, which differs much in the nature of its construction, having a strengthened coultter, and an application of lord Somerville's mould-board made to it, is not unfrequently made use of in some of the southern districts of the kingdom.

This very useful form of skim-coulter plough is indeed much had recourse to in the neighbourhood of Ingatestone, in the county of Essex. And a further variety of this kind of plough is made use of in some parts of Oxfordshire. Mr. Kimber, of Little Tew in that county, both makes and employs this sort of tool, and finds it to be extremely useful for certain purposes. The skim in this implement is fixed to a fore coultter, by which means it is found to do the work much better, than when attached to the common coultter, in which way some have found that it could not work well at all. Upon hollow land, it is, however, not at all approved of, as slicing the surface of such ground is supposed by Mr. Kimber to be much worse than turning it over in the usual manner, and letting the surface-vegetables be laid into the diagonal position, with an edging of them sticking, perhaps, out of the seams. But it is supposed by Mr. A. Young, that in this notion Mr. Kimber is in an

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error; as he contends that the vegetable growth upon the surface is to be rotted in some way, for it is ploughed in in every mode of tillage, and the only question is, how to rot it in such a manner as soonest to convert it into the food of plants, so as they may be able to avail themselves of that food. This surely is the means of lessening, in the greatest degree possible, that additional hollowness which must be caused in a measure, plough it in how you will. The furrow of common ploughing four, five, or six inches, is so shallow, that the warmth of the sun, the moisture of rain, and the influence of the atmospheric air, act to the bottom of it, and will convert vegetable substances into gaseous matter sooner than if exposed to the immediate action of the sun and air, which in all dry weather preserve them, and must occasion a greater hollowness than in the other case, in which they are sooner consumed. And further, the great success which has attended the system counter to that of Mr. Kimber, could not have taken place if his theory was just. Good farmers, when they skim-plough, or common plough hollow land, will adapt the operation to the soil the crop is to be put in, and the season of tillage; and by these means provide a remedy for the expected evil: but this is as clearly applicable to a skim as to no skim at all.

This skim-coulter plough does not answer in some management, or where the soil is of a stony nature, but still many farmers in this district approve of it highly; and some think it excellent, especially for ploughing turnip land for barley, when the weather and treading have made it a little stiff, also, if the fallow for turnips has become a little weedy; but do not use it on layers for wheat, as they plough their lays for that crop deep. Particular farmers, however, find that it makes neat and perfect work on clover lays for wheat crops, not going more than three or four inches deep, and yet skimming off sufficient to bury every thing, and leaving the seams without any vegetable growth to be seen. Shallow ploughing clover land for wheat, is thought essential on these stone-brash soils.

There are still some other modes of constructing these kinds of ploughs, as may be seen in the Essex corrected, and some other Reports of the Board of Agriculture.

There is also a very great difference in the construction of the common swing-ploughs of this district. The *swing-plough* with an improved breast, which is employed by Mr. Western, is of a very beneficial kind, and is held in much esteem in several different places.

About South-End, in the same county, they have also a *swing-plough*, which is pretty generally in use, but which has an uncommon degree of convexity in the fore-part of the breast.

And a very good *swing-plough*, which has an extremely effective addition for the purpose of keeping the coultter fixed steadily in its place, has been long in use upon all the estates of the late lord Petre.

The *Miner* is an implement of the plough kind, that is very useful for the purpose of loosening the soil to a great depth without bringing it up to the surface, a mode of operation which is particularly useful for various sorts of tap-rooted plants, as well as for extirpating the roots of such weeds as strike deep into the ground. For these purposes it may be employed in the bottom of the furrow after the common plough. It is constructed in a very strong manner, having only a share without any mould-board.

The *Beverston* plough is another sort of useful tool of this kind, which was invented by Mr. Tugwell, and has been employed in some districts in the more heavy kinds of land. It has its principle of draught given it in a very effective manner by an ingenious contrivance of iron work, in which,

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according to lord Somerville, the point of draught is *perpendicularly* above the *point of action*, or the throat or breast where the share fits on. A plough of this nature is shewn in *Plate XXXI. Agriculture, on Wheel-ploughs*, at *fig. 1*, in which its dimensions are as follow :

	From	to	Ft.	In.
	1	to 3	6	0
	3	— 4	3	8
	3	— 5	4	3
	5	— 6	2	5
	7	— 6	2	8
	1	— 3	1	5
	1	— 8	2	10
	1	— 9	4	8
Heel to tuck-hole of share	-	-	2	6 $\frac{1}{2}$
Tuck-holes to point of share	-	-	0	8 $\frac{1}{2}$
	a	— b	2	4
	d	— e	2	5
	c	— d	1	4
	d	— e	2	5
Diameter of wheel	-	-	1	9
	d	— f	0	11
	g	— b	0	10 $\frac{1}{2}$
	e	— i	1	0 $\frac{1}{4}$
	k	— l	0	9
Breadth at heel	-	-	0	9
Breadth of fin	-	-	0	7
Top of beam at heel to ground	-	-	0	8 $\frac{1}{2}$
Mould-board projects at top more than breadth at heel	}	-	0	6

The *Double Furrow* plough is a kind of implement of this sort, which has, at least in its improved form, been found highly useful and advantageous. Ploughs of this sort have been constructed in various ways, as with a double beam, and with a single beam only, which is the manner in which they are usually made at present. But the most improved plough of this nature is that constructed by lord Somerville, and for which he has taken out a patent. It is advantageous in performing more labour in a given time with a certain strength of team, than other sorts of ploughs, as producing two furrows at a time. It has been found useful on the lighter sorts of land where the ridges are straight and wide, though some think it more confined in its work than those of the single kind. A principal advantage in which it excels other sorts of ploughs, is in the saving of the labour of one person, and in doing nearly double the work with but little more strength in the team, in the same time. It is remarked by his lordship, in speaking of this sort of plough, in the second volume of *Communications* to the Board of Agriculture, that the clean and sharpened construction of the breast and throat will warrant their breaking deep stiff land with infinite success; in this case the coulter should be set nearly straight with the throat and shares: in cross ploughing, or stirring, they may be set three-quarters of an inch towards the land, by which greater dispatch will be obtained in seed time. Should they carry too deep a furrow, the correction of their shares is obvious; should they hug too much to the land, or go unsteady to the ploughman, it must absolutely proceed from a want of setting them true, relatively to each other, and from an undue regulation of the cops; here a nice attention is required: their power also of cutting a furrow level at the bottom should afterwards be proved on a level floor. The want of this practice in the maller has condemned many a good plough, when the fault was in the ploughman only. It may suggest itself, that two-furrow ploughs are unfit for

hilly ground, but the very reverse is the case. The effect of ploughing across the inclined plane, or hill, is that of carrying the soil in time to the bottom of the field, which must be carted bodily up again at a great expence: let such land be worked from the top to the bottom; let one furrow be carried with the hindmost or land share up the hill, and two down, so will the power be apportionate to the weight with which it has to contend, and needless toil to the team will be saved. That power which was required to carry two furrows up would be superfluous in carrying the same down the hill, and the effect will be as 3 to 4, that is, an acre and a half, instead of two acres *per* day.

A plough of this improved construction may be seen in the plates on *wing-ploughs*, at *fig. 6*.

In regard to the improvement of these ploughs, his lordship observes, in his tract just noticed, that from the design, which represents a side view, it may be observed that, besides the moveable plates, there are coulter, stays, &c. and how firmly the plough is put together, and how little waste there is of timber and iron work. And after noticing its construction in the breast so as to lessen resistance, it is added, that the double-edged coulter is formed also to produce this effect; in strength and substance it is equal to the common or narrow coulter, and being less broad, presents so much less for resistance: when in work, the stay gives a steadiness to it, the coulter being subject to frequent derangement, to correct which must occasion frequent stops, alteration of the wedges, and loss of time. And it is afterwards stated, that an economical and spirited system of farming labour already prevails in some districts; in none more eminently, with respect to ploughing, than in Essex, on both banks of the Tweed, in Suffolk, Yorkshire, and Norfolk. Here it would be no object to invade the system already established, for innovation is not palatable to farmers; nor should the first deep ploughing in Kent give way to any novel system; there can be no better husbandry: but, except for beans and tap-rooted plants, subsequent deep ploughings are injurious, both as to expence and effect. Dr. Hunter, in his *Essay on the Roots of Wheat*, points out the depth needful for the supply of seminal roots in wheat and wheat corn in general; that which is turned down then, in the first deep ploughing, should be rotting for the succeeding crop. Let not the bottom know what the surface is doing! Here two-furrow ploughs, even admitting them incapable of carrying a deep furrow, which is far from true, must come into admirable effect, for a twofold advantage can be taken,—of the season in sowing, and the work being done at half the expence. But where men are chained down by long usage, and perhaps, for the convenience of constant road work, to teams of heavy corn-eating cart-horses, two-furrow ploughs become, he supposes, objects of extreme importance, because their horses will not feel the difference between their own single furrow, working one acre, and the well constructed two-furrow plough, with two acres *per* day: here is no system deranged, and double work done.

The counties of Leicester and Stafford have profited much by their use under these circumstances, although their two-furrow ploughs, in other respects good, have never been so constructed in the throat and breast as to destroy the means of resistance. Without doubt, obtusity in these particulars must add incalculably to the weight, must break the furrow, and so spoil the work; moreover, let it not be forgotten, that removing resistance not only diminishes the labour of the cattle, but is also of equal advantage in increasing the strength of the implement;—the resistances with a well constructed, and with an ill constructed plough, in performing the same work, are as different as the resistance

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of a well constructed king's cutter, and of a floundering Dutch merchantman, sailing with equal velocity.

And the noble inventor adds, that in his own county these ploughs have met with a reception more favourable than could be expected in so short a period. On the 16th of October, 1798, two-furrow ploughs were not thought capable of breaking up ley-ground, although in constant use for fallowing, but from their construction requiring six oxen. On the 16th of October, 1799, a very large and respectable farming society gave a premium for two-furrow ploughs, working ley-ground only. On the day following, in the presence of many members of this society, one acre and a half of ley-ground was broken up by four oxen, with infinite ease to themselves, in three hours and fifty-five minutes, they having, as part of a constant course of work, ploughed seventeen perches short of an acre of ley-ground the same morning: this was done to prove the effect of moveable plates at the extremities of the mould-board, that the furrows might be laid more or less flat; for mould-boards, formed to lay furrows in ley, so as to give the moist soil to harrows, cannot be of that form best calculated to make good work in stirring earths, more especially the last, which ought to be thrown up in small seams, as it were, that the seed may be duly buried. It has hitherto been held necessary to rip off the plate for this purpose, and drive in wedges, by which the mould-plate must be injured. From the trouble attending this operation, it has for ever been omitted, and the land, of course, imperfectly worked. But this inconvenience may be remedied, and the mould-board be adjusted with great facility and expedition, by the following means: when the mould-board is formed, and its plate fitted as usual, let the parts marked *a, a*, be cut off, and again connected with the fixed part of the mould-board by means of flat hinges, or of thin flexible plates of tempered steel, or of hard hammered iron, so as to admit of those parts being set to have different inclinations with the fixed part of the mould-board: by means of two screws passing from the inside through the lower parts of the handle of the plough, opposite the backs of these moveable pieces *a, a*; those screws may be made to keep them at any desired degree of inclination, according to the nature of the work to be performed. It is stated farther, that ley-grounds cannot be laid too flat, or seed-earths too much on an edge; and by this improvement of the mould-board the plough may be instantly adjusted for either purpose: when these moveable parts are screwed outwards, it will cause a proportionate convexity in the base of the furrow, and so give more earth to cover the seed. That plough which can give most mould to the harrow is the best for a ley crop. That part of the mould-plate that is marked with the dotted line *cc* being found most liable to wear, should be made of a double thickness, that is, twice the thickness of a new crown-piece; it will then last nearly as long as the plough. The increased weight of draught, when these moveable plates were extended, did not appear, in a two-furrowed plough, to be by the cops more than twelve pounds, in ley-ground, at six inches depth. It is needless to state the success of these alterations; the friction in furrows required to be laid flat was less than could be supposed, probably not more in both furrows than from twelve to six pounds.

With regard to the moveable mould-plate, and its operation on the furrow. If the breast of a plough be obtuse, the whole struggle lies there,—there is the furrow turned, and the hindermost part of the mould-plate has little or nothing to do: the furrow may be well laid for one particular sort of work, but the breast of the common plate can only be of one form, therefore can only turn one description

of furrow; and this must be done at an increased weight of draught: this is beyond all contradiction. In these moveable plates, the furrow is not turned until it reaches the remotest point of action, at a distance of two feet from the point where the furrow is cut off from the land. By the gentle and progressive turn of the mould-plate, the earth hangs balancing, as it were, in the air, and the slightest pressure of the moveable plate lays it over. The principle of this plate is, as has been seen, to deposit the furrow at any angle required, and to qualify it thereby for the different purposes of husbandry. There is another principle in ploughing equally well established; namely, that the base or bottom of the furrow must be cut level and true, or the surface of the work will be untrue, and the crop derive otherwise material injury. To effect this, the plough must go close at heel, and upright in its work, therefore the furrow must assume one form only. A third principle equally certain is, that in ploughing ley-ground, or for sowing on one earth, the furrow should be laid far more flat than is advisable in the last stirring or seed earth. As for barley, &c. hitherto, we have obtained one of these objects at the expense of the other. No two-furrow plough could, for an instant, make work, except in an upright direction; for if it did, the land or left share would be buried too deep, and the furrow, or right share, would be thrown out of work. But still further the writer will be bold to say, that no single-furrow plough, whether constructed in China, in France, or in England, has ever yet, or ever will be able to answer all these purposes, without the aid of a moveable plate; and therefore, however good for a limited purpose it may be, it cannot be called a perfect implement; it is incapable of doing all that is for ever required of it to do. It would be the height of folly and extravagance to construct two implements where one would do. He therefore sits contentedly in the conviction, that these plates must be resorted to. And in many cases, the moveable plate will probably supersede the use of the turn-wrist plough.

His lordship adds, that it cannot be deemed irrelevant to the subject, here to state the result of a challenge given to the owner of these ploughs, to plough 24 days work successively, on his majesty's farm, either at Kew or Windsor, on the 10th of March. The challenge was accepted, and it is a matter of regret that this challenger did not venture to appear, although repeatedly urged to do so: because a trial for such a length of time, and between two breeds of cattle so distinguished for their powers in labour, must, his lordship supposes, have thrown great light on a subject of such importance to the farming world. That something, however little, might be proved, his majesty was pleased to allot the only piece of land then unfurrowed, 17½ acres, statute measure, which was ploughed by a two-furrow plough, four Devonshire oxen, six years old, a man and a boy driver, in six days and a few hours: the oxen were in good order at the commencement of their work, and finished it in higher order, as well as in flesh, than when they began. This is a strong fact; but numbers in the vicinity of London know it, and are ready to prove the fact. These oxen, as is the custom in their county, never tasted corn.

Mr. Perrott of Evesham, speaks of these ploughs as doing their work well, and as being on the best construction he ever saw. And Mr. Westphaling of Radvale, near Rofs, in Herefordshire, observes, that this plough certainly makes exceeding good work, and turns the furrows remarkably well. The time of its arrival was not the most favourable, as their soil, in general light and easy, is now, by the wet and fun, caked, and works with great difficulty; notwithstanding which, not one farmer but says it will be of great

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use in many instances. It is lucky for him that his ploughman likes it double, and is inclined to use it on all occasions. Mr. Dougall also observes, that Mr. Shirely from Warwickshire gives a good account of the double-plough; and sees no difference between the draught of four horses in the double, and his own single-furrow plough; a circumstance which has been noticed by others in some cases.

With regard to the advantage of these ploughs, his lordship offers the testimony of another person, personally a stranger to him; his partiality, therefore, is to the plough itself; not to the inventor. He is not disposed to draw absolute conclusions from ploughing-matches, because much may depend on accident; besides that, exertions might be made for three hours, without much apparent distress, which nevertheless could not be maintained for three weeks, and so the public become misled. Yet, as this match was much talked of, and many questions on the subject put to him, he wrote to Mr. Tweed to know the particulars: his tale is plain and unvarnished.

Mr. Tweed's land is strong and stiff in quality, and not a turnip has been sown there for more than twenty years past: it is what we term bean and wheat land. The practice of that country has been to allot 100 acres of land in tith to four horses; therefore let it be remembered, that the saving of expence obtained by the use of the two-furrow plough does not arise from a comparison on lands, expensively cultivated with four or five horses, incurring a charge of twelve, sixteen, or twenty shillings *per acre*; but in the county of Essex, and in the vicinity of Chelmsford, where it has long been a system to work these strong soils with two horses and no driver: and where this art is allowed to be as well understood, and practised with as much skill and economy as in any part of Europe, Flanders not excepted. Mr. Tweed's account of the business in a letter to his lordship, is this: "In answer to the letter I have just had the honour to receive, I take the liberty of stating the experiments I have made with your two-furrow plough upon strong land, as well as the result of the only match I have yet been engaged in. I put my first plough to work with three horses and one man, against two of my own, and four horses, held by two remarkable good ploughmen, who are very much averse to any new implements: after exerting themselves to the utmost every day for a month, upon clover lays, bean and pea etches, for wheat, they allowed, very much against their inclinations, that it performed the work best, which is entirely owing to the superior form of the breast, and the great advantage derived from the moveable plates. This trial having perfectly convinced me that there is an absolute saving of five shillings a day every day they are used, I ordered a second, and soon after a third, and have ever since had all my work done with them, nine horses, and three men, which before employed six ploughs, twelve horses, and six men, causing a reduction of one-fourth the horses, and one-third of the men, and is, in my opinion, one of the greatest improvements that ever was made in agriculture, for which I conceive the public and myself highly indebted to your lordship. Being at Mr. Lovibond's rent dinner (the gentleman I live under), I made a proposal to the company, who were all farmers, to plough, for a wager, two acres of any land with the two-furrow plough and three horses, as well, and in the same time, as one acre could be ploughed by a single one and two horses. This was accepted by Mr. Gibling of Hatfield, and a field of his fixed upon that had been sown with rye directly after harvest, (stubble) upon a wheat etch, and being fed by bullocks and sheep in wet weather, poached a great deal; and when the ploughing took place, was extremely dry and bound. A great num-

ber of spectators attended; at starting, the odds were three and four to one against the two-furrow plough, as it was supposed not able to break up and turn hard work; after a fair contest, five farmers were appointed umpires, who were unanimous in their decision, that the two-furrow plough, having executed the work foundest and best, and in the least time, was entitled to the wager.

Sandon, 1802. I remain, &c.

"In a second trial, the sweepstakes were adjudged by the umpires to the double-furrowed plough of Mr. Thomas Little Tweed, of Sandon. A double-furrowed plough was allowed, by the articles, to have four horses; but Mr. Tweed's was worked with only three, and ploughed two roods, not only in the best agricultural manner, but within considerably shorter time than the other common plough did their one rood." The noble writer adds, that in addition to this testimony he has only to say, that it has not been his ill-fortune to verify the old adage, which says, "a prophet is no prophet at home;" for these ploughs are spreading, with unexampled rapidity, over the county in which they originated: and at a very large meeting of farmers, held there lately, no ploughs of any other description appeared, and the prize given by subscription was contended for by these ploughs only.

It has been argued, that a two-furrow plough, with the double mortised beam, has an advantage over that of the curved single beam, inasmuch as, by a screw, the beams can be brought nearer, or set more apart, for the purpose of cutting a wider or narrower furrow. In common ploughing, no great benefit was contended to result from this power, but in sowing under furrow, great things were to be expected. Now let us look round, and see where the tillage husbandry is reputed to be good, and single-furrow ploughs in use, consequently, the size of the furrow is optional; let us see whether the wide or the narrow furrow is preferred. We can in a moment instance the usage of the country round Weltham, in Essex, and Peterham in Moulsey, in Surrey. In both instances the land is level and good, and the broadcast husbandry very high in reputation, as their crops, on an average of years, are ready to testify. Here the seed is ploughed in at a ten or sometimes at an eleven inch furrow. We are not, however, to establish a general system on two or three instances—twenty or thirty might, perhaps, be adduced; but they are worth, at least, one assertion. It has been his determination to avoid, as much as possible, any comparison of other implements with his own; but he may say, that he learns from one, who is as good a judge of husbandry as any among us, and has compared the double-beam two-furrow with that of the curved single beam in mortising and iron-work, and consequent tendency to derangement, there is an absolute difference of one horse in four in favour of the patent plough.

And if land is inclined to be wet and stiff, the less trod it is, the better. Here Mr. Tweed's mode is to work three horses, one on the land, and two in the furrow, one before the other, instead of three abreast; and it appeared by the regulation of the *cops*, that is, an iron screw, acting through the end of the beam to regulate the depth of work, how little he has added to the weight of draught. It is almost needless to say, that the true point of draught should be exactly in the centre notch of the *cops*; any deviation to the right or left can only be for the purpose of counteracting a false friction or pressure, which must have added to the weight. The size of a furrow, provided it be of just proportions, is optional; that which he has preferred is nine inches and a quarter, and for every purpose of husbandry he knows of none better. It will give as much mould,

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mould, or 'crumb,' (as we term it, provincially) to the harrow, as any other furrow whatever: this is the best object in ploughing for a ley crop. If ley peas are to be sown, every other furrow, at nine inches and a quarter each, there will be an interval of eighteen inches and a half between the rows; a distance as much approved of as any we know. At every third furrow for beans, the interval will be twenty-seven inches three quarters; at every fourth furrow, thirty-seven inches; and it must be allowed, that if any implement be attached to a plough for the delivery of pulse, or white grain in drills, the upright position necessarily belonging to the two-furrow plough, when in work, will qualify it admirably for the purpose.

Upon the whole, these observations place the utility of double ploughs in a point of view, that seems to deserve the notice of the practical farmer in a much greater degree than has hitherto been any where done.

*Norfolk Plough.*—This is a kind of plough, that is held in much esteem in that, as well as some other light districts, as performing the work in an easy and expeditious manner without any great strength of draught. The carriage and wheels in all ploughs of this nature, however, form objections to them, and at the same time render them awkward, clumsy implements. An improved plough of this sort is shewn in the plate on wheel-ploughs, at *fig. 3.*

The head and beam are short; while the carriage part and wheels stand very high in this sort of ploughs, of course the fore end of the beam is much elevated, by which, advantage is gained in driving the horses or team, as it is usually drawn by two horses yoked abreast, the ploughman directing them by reins, by which there is a saving of one person in the business.

In the county of Essex, Mr. Rogers prefers the Norfolk plough, in two circumstances, to the common wheel-plough of that district: the point of the share is nearer to the points in the wheels, where they touch the earth, a shortness which, in his opinion, eases the draught; and the mould-iron or plate, as it is called in Norfolk, turns the furrow better.

The common Essex *wheel-plough* is said, however, to be a very good tool of this sort, and which is used extensively all around the town of Kelvedon. It has the carriage part for the wheels somewhat in the form, and the beam raised up at the point much in a similar manner to that in the Norfolk plough.

*Kentish Turn-wrist Plough.*—This is another sort of strong plough, much used in the strong heavy, flinty or rocky soils in that district. It is a very powerful implement in such sorts of land, but extremely clumsy, heavy, and awkward. The expence of it, when complete, is mostly about five or six guineas. A representation of it is given in the plates on wheel-ploughs, at *fig. 4.*

In the survey of that county, it is described as consisting of a beam of oak ten feet long, five inches deep, and four broad, behind which is a foot five inches by three and a half, and three feet and a half long, on the top of which the handles are placed; the foot is tenoned to the end of the beam, and mortised at the bottom to the end of the chep. Through the beam, at two feet five inches distance from the foot, is a sheath of oak seven inches wide, and one and a half thick, which is mortised into the chep in an oblique direction, so that the point of the share is twenty-two inches distant from the beam. The chep to which the share is fixed is five feet long, four inches wide, and five inches deep. The share is of hammered iron, weighs about thirty-two pounds, is twenty inches long, and from four inches and a half to seven inches wide at the point. The upper

end of the beam rests on a carriage with two wheels, three feet two inches high. On the axle-tree is a gallows, on which is a sliding bolster to let up and down. Through the centre of the axle is a clasp iron, to which is fixed a strong chain called a tow, that comes over the beam, so fixed, as by means of notches (or a pin called a check) to let the whole plough out a greater length from the axle, thereby letting it down to a greater depth.

A different kind of *turn-wrist* or *revolving* plough has been lately invented by Mr. Lumbert, in which there are two shares, one of which at the end of each furrow, or every length of the field, turns round, and lays another flag by the side of the last, disposing it all the same way, in a somewhat similar manner to that which has been described above. Figures of this implement may be seen in the Corrected Report of Oxfordshire.

And besides these different sorts of ploughs, there are various other kinds in use in different districts, as the *Single* and *Two-wheel Plough*, both of which are good ploughs for particular purposes; but any of the light swing-ploughs, may be readily converted into wheel-ploughs simply by the addition of that apparatus.

Also the *Hampshire Patent Iron Plough* is a very useful plough in some cases. It is seen at *fig. 2.* in the plate on wheel-ploughs.

A plough has likewise lately been invented, in Berkshire, by Mr. Berriman of Speen, which is denominated a *Pressing Plough*, and which is held in much esteem by many persons, who have given it a sufficient trial, especially upon clover lays. It is constructed under a patent, and costs about twelve guineas. It is stated by the inventor and patentee, that it "is intended to be drawn over the land recently ploughed, in order to press in the grips or channels made by the common ploughs, that no hollow places may remain for the seed to be buried too deep, and that every kind of grass, stubble, or any thing else, may be pressed into the ground. After the field has been pressed, almost any kind of seed may be sown by broad-cast; and it will, by rolling into the channels of the pressing wheels, be evenly and equally buried at a proper depth, after being harrowed, and consequently be kept out of the way of birds, and will come up more regularly. It is evident, therefore, that there is no necessity for sowing so much seed to an acre, as in the common broad-cast husbandry; thus combining the advantages of the drill and the broad-cast systems. This machine is also of such a construction, that in the most uneven ground, every wheel acts as fully and amply as if it were drawn over a level surface. One of the pressing wheels, with or without the line before it, may be put before a common hand drill, and drawn by one horse, by which means any ground, however foul, may be drilled; or a drill may be added to the pressing machine, which has been described, with three wheels, so as to throw the corn into the channels."

Tools of the plough kind have likewise been contrived with more than one coulter, in order to reduce the surface more effectually; but these have in modern practice given way to implements of the harrow kind, such as cultivators, scarifiers, scuffers, &c.

*Double Mould-boarded Plough.*—This is a kind of plough often used with advantage in making the furrows in setting potatoes, cabbage, and other similar crops, and earthing up such as are planted in wide rows. Those whose mould-boards move on hinges, and may be set wider or narrower at pleasure, are the most convenient.

*Single-Hoe Plough.*—This is also often useful in stirring the mould in the intervals of different sorts of crops, and laying

laying it to the roots of the plants, and thereby preventing the growth of weeds. The mould-board in this plough is so constructed, that it can be raised or depressed at pleasure according to the nature of the crop, and the intention with which it is used.

The *Single-Horse Plough*, too, is extremely useful for several purposes in tillage husbandry. This sort of tool is very common on the farms in the county of Norfolk, but they are made upon a very different and much inferior construction to this, which is in use upon the estate of Mr. Western in Essex, and found to work extremely well, but without a wheel. The different parts have the following proportions in his ploughs of this kind.

		Feet.	Inches.
From 1 to 2		6	2
1 — 3		2	6
5 — 4		3	2
2 — 6		1	1
3 — 13		0	6
13 — 4		1	4
8 — 9		1	10
8 — 14		1	2
4 — 12		0	11
15 — 16		0	9
a — b		1	0
c — d		0	6

Ploughs have likewise been invented and constructed entirely without coulter: of this kind is the *Argylshire* plough, contrived by the Rev. A. Campbell, on which it is observed, that as the common plough is very liable to be choaked by an accumulation of stubble, &c. in the narrow angle under the beam before the coulter, and, not unfrequently, is thrown out of the ground, by catching small stones or shells between the points of the coulter and sock, both these inconveniencies have therefore been attempted to be obviated by throwing aside the coulter altogether, and supplying its place by an upright feather attached to the *land* side of the sock, and which serves the purpose of slicing off the furrow in the same manner as a coulter; for, being laid off on the same angle, it is found, in practice, to succeed to admiration. Small ploughs of this sort employed in horse-hoeing turnips, beans, cabbages, &c. of which the weight of the wooden part is about forty pounds, and of the iron-work about thirty-six, and cost about two pounds ten shillings each, are made in a very accurate manner, by Messrs. Brown and Co., coach-makers, Abbeyhill, Edinburgh, who have made several, and can supply any number of them on demand. This plough is found to answer extremely well, more especially in taking the earth away from the sides of a drill crop; for which purpose it is conceived to have attained absolute perfection; as its broad upright feather, which operates as a coulter, completely shields the plants from all risk of earth falling on them from the left side of the plough, while, at the same time, the ploughman correctly ascertains, that the part of the plough below ground, approaches no nearer to the roots of the plants, than the upper part does to their leaves; so that he can bring the plough to slice off the earth close in upon their sides, where necessary.

In point of draught, it is precisely the same as the common plough. It obtained the premium from the Highland Society.

And the same gentleman has invented a very curious and useful muzzle or cope for ploughs, which, by a single twist of a screw, gives both *earth* and *land* or depth and breadth at the same time, or either, as may be requisite, even in the

most minute degree. It weighs from ten to thirteen pound according to the size of the plough it may be used for, and costs from nine to thirteen shillings. It is strong and durable, and may be had at the above manufactory.

There are still a few other kinds of ploughs, which are contrived and constructed for the purpose of accomplishing different views and intentions in husbandry, such as those for paring or taking off the surface or sward of the land, in different circumstances; for the removing of the wetness with which it may be impregnated or saturated in its more superficial parts, and for the forming and improving of roads in different cases, &c., as may be seen under their several proper heads.

In the first of these intentions, the *common paring plough*, and the *improved paring plough*, which is in use in the county of Chester, are extremely good tools, especially the latter, which is very much employed in different parts. See *PARING and Burning*, and *PARING-Plough*.

In the second view, there are different sorts of ploughs made use of in different places, and according to the different circumstances and soils in which they may be employed. The *common draining plough* is had recourse to in some of the midland districts of the kingdom for the more general purposes with great success, for which it is said to be a good, and not very expensive tool. The *drain* or *gutter* plough, which has been recommended by the duke of Bridgewater, is also an useful plough of this kind. It has been found beneficial in forming at once gutter drains on grass lands, which are retentive of moisture, but it requires a great strength of draught in all cases. The *common mole plough*, and the *improved mole ploughs*, by Lumbert and others, are likewise very good implements in many cases especially those of the latter kinds. There are also some others, which answer different purposes of the draining kind in a very effectual manner. See *MOLE-Plough*.

In the last intention, a very useful plough has been invented by a blacksmith of the name of Brand, which will be described under the head of roads. See *ROAD*.

**PLOUGH**, among *Book-binders*, is a tool with which they cut the leaves of books smooth. See *BOOK-BINDING*.

**PLOUGH**, or *Plow*, in *Navigation*, an ancient mathematical instrument made of box or pear-tree, and used to take the height of the sun, or stars, in order to find the latitude.

It admits of the degrees to be very large, and has been much esteemed by many artists; though now generally disused amongst us.

**PLOUGH-Alms**, a duty anciently of a penny, paid to the church for every plough-land, or hide of land.

“De qualibet carucat; juncta inter Pascha & Pentecosten unum denarium, qui dicitur plou-almes.” *Monast. Ang.*

**PLOUGH-Bote**, in our *Old Writers*, a right of tenants to take wood to repair ploughs, carts, and harrows, and for making rakes, forks, &c.

**PLOUGH, Gallows of a.** See *GALLOWES*.

**PLOUGH; Handles of a**, the name given by farmers to the two pieces of the plough fastened to the earth-board, and to the sheat, and serving the ploughman to rest his force upon in the guiding of the plough. When they are considerably long, the plough is always guided the better, and the land is better tilled; but the lazy ploughmen are apt to cut them off shorter, that by bearing their whole weight upon them, they may, in a manner, ride, instead of walking. If they should ride, in this manner, on the long handles, they would tilt up the end of the beam, and raise the plough out of the ground.

**PLOUGH-Head**, a name given by the farmers to the foremost

moist half of the plough, or that part containing the two wheels and their spindle, the box, the crow-staves, the pillow, the wilds, the tow-chain, and bridle-chain, and the stake. See PLOUGH.

PLOUGH-Land, *carucata terra*, in our *Ancient Customs*. See CARRUCATE.

PLOUGH-Monday, the next Monday after Twelfth-day. The ploughmen, in the north-country, on this day, draw a plough from door to door, and beg plough money for drink.

PLOUGH-Tail, a name given by the farmers to that part of a plough which contains the beam, the coulter, or coulters, the share, the sheat and under-sheat, the earth-board and handles, as also the drock, the ground-wrists, and the retches. See PLOUGH.

PLOUGH-Jogger, a term provincially applied to a ploughman of the more ordinary kind: a sort of bungler in the work of ploughing.

PLOUGH-Wright, a term applied to a person whose business it is to make ploughs, and other implements of husbandry. Workmen of this sort are mostly very common in all country situations.

PLOUGHING, the act of breaking up, and loosening the soil by means of a plough and proper teams. This or some other mode of loosening and turning up the upper parts of soils, is in all cases necessary to render them more suitable for the reception of the seed and the growth of the crops, and they have been constantly in practice since the very infancy of the art. As it is only by some such method that a proper bed for the roots of the young plants can be prepared, and a proper condition of the land for supplying them with nourishment be provided; in performing the operation it is a matter of great utility for the farmer to have particular attention not only to the state and nature of the ground, but also the season of the year, and kind of crop that is to be cultivated, as in this way the preparation of his lands may be rendered more perfect and suitable, and at the same time some of the natural defects under which they labour be removed. In almost every sort of soil it has been observed, that ploughing them up before the latter end of the autumnal or beginning of the spring season commences, renders them capable of imbibing and retaining a large portion of moisture for the succeeding summer; while the turning them up during the spring and summer, causes much waste and discharge of moisture by evaporation and other means.

In cases where the soil in its natural state is too dry, and possesses too little tenacity for the growth and support of such crops as are necessary to be put into the earth in the spring months, the land, by being fully brought into a state of preparation for the crop in the autumn, and the seed introduced without any additional ploughing in the spring season, may be preserved in a more moist and adhesive condition, consequently in a more proper state for the growth of such crops; but where the soil is naturally moist, and the crops that are to be cultivated require that it should be dry and mellow, when they are put into the ground, the ploughing, by being deferred for the winter, and performed as late as possible in the spring months, when it is become a good deal dried, will be the more advantageous for the crops that are to be grown upon it. But there are other circumstances that constantly demand attention in the process of ploughing land. In all the stiff, heavy, and more adhesive kinds of soils, that are much disposed to the retention of moisture, whether they be perfectly clayey or have more of a loamy quality, it should be a common rule never to plough or turn them up when wet in any degree, except where the nature

of the crop requires it: as when such sorts of lands are ploughed under such a condition, the parts of which they are composed are very apt to cake and run together into hard lumps, that require much trouble and difficulty to be afterwards reduced into a fine state. And further, great injury is produced by the treading of the team, as well as a much greater power necessary in performing the operation. They should not, however, be suffered to become in such a state of dryness as to oppose too much resistance before the work is undertaken. It, however, has been suggested, that in all such lands where the clayey material is the most predominant, the ploughing may be performed when the ground is wet without injury, where the work is executed before the commencement of the frosts in the winter, while in the spring the team should not be suffered upon the ground until it be in a properly dry condition. Communications to the Board, vol. iii.

But in all those sorts of land where there is a considerable depth of vegetable earthy matter, as those of the moss, moor, peat, and fen kinds, the ploughing of them, when under the state of tillage, should be executed when they are in a favourable condition in respect of dryness, as under the contrary circumstances they can rarely be ploughed with benefit, and in many cases not at all.

However, in most of the more light dry sandy or gravelly sorts of land, and perhaps in some of the more mellow descriptions of the loamy kinds, the work of ploughing may be had recourse to, especially in putting in the crops, when they are in a considerable degree impregnated with moisture, without any disadvantage being sustained, and sometimes even with benefit, as they are liable to part with their moisture in too quick a manner. This circumstance should indeed direct the farmer in such sandy sorts of land, to stir them as little as possible when the season is hot and dry, so as merely to keep down the weeds, as much mischief may otherwise be done by the exhalation of moisture that may be caused. These sorts of lands are of course managed with much less trouble and expence of teams, as well as with less difficulty in respect to the state of the weather, than most other sorts.

The depth to which lands should be ploughed, should in some degree vary according to the nature of the soil, and the crops that are to be grown. It would likewise seem proper that the feed furrows should have less depth than those ploughings that may have preceded it; and perhaps, in general, deep ploughing is not so necessary as has been supposed, except in the cases of tap-rooted plants. It has, indeed, been well remarked by Mr. Kent, in his Hints to Gentlemen and Farmers, that though deep ploughing has been much advised by different writers lately, on such sorts of land where the bottom and surface are of opposite qualities, and neither of them good; a mixture may in such cases be advantageous, and may be effected by their going below the usual depth; but where the top and bottom, to the extent of eighteen or twenty inches, are similar, he does not think it ever proper to exchange the surface part, which has been gradually for a great length of time increasing in fertility, for the under part, which has only the property of being more fresh. He has stated that ploughing deep, except for certain sorts of crops as above, is never requisite or adviseable. The growth of the common crops of corn or of grass does not require any great depth. He likewise remarks, that where ground is ploughed to a great depth, the roots of weeds are only turned over, without being removed or thrown upon the surface to decay, while clean light or shallow ploughing dislodges them in a perfect and effectual manner. In some districts, as that of Cornwall, where

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where the soil is extremely shallow, a large produce is afforded; and in several other counties the land is found to be injured by deep ploughing, or going below the usual depth, to which the lands have been ploughed. It is added, that hand-hoeing is known to every one to be more effectual in cleaning land than a ploughing; and the process of paring and burning renders land perfectly clean, though it be only two inches in depth. All these tend to shew that ploughing to a great depth is by no means necessary in the cleaning of land; and it cannot but be generally admitted, that the longer the manure is kept within three or four inches of the surface the better, especially on light soils, through which it is apt to sink and escape too quickly.

It is, however, stated in the Calendar of Husbandry, that in some of our well cultivated counties, the shallowness of the ploughing is remarkable; when almost every other point of management is very spirited and complete, a deficiency in this may not be at once perceived in the crops; but no doubt failures are often caused by it, though attributed to other circumstances. Therefore the following hints are thrown out: 1. An additional depth should first be gained in autumn, that a successive change of seasons may take effect in atmospheric influences before any seed is ventured in the raw stratum brought up. 2. The quality of that stratum should be examined; it is sometimes sterile by reason of an acid, discoverable by boiling in water, and putting that water to the test of blue infusions. 3. Animal and vegetable manures cannot be buried: at whatever depth they are deposited, their constant tendency is to rise to the atmosphere. 4. Fossile manures are extremely liable to be buried, having a constant tendency downwards. Chalk marle and clay are sufficiently soluble, or so miscible with water, as to sink in a regular mass; and are sometimes found much below the path of the plough. 5. In soils of a poor hungry quality, there should be some proportion observed between the depth of ploughing and the quantity of manure usually spread; but this does not hold good on better soils. 6. Soils are rarely found that ought not to be ploughed, in common, six inches deep; many ought to be stirred eight inches, and some ten. 7. One deep ploughing (to the full depth) should, it is conceived, be given once in twelve, eighteen, or twenty-four months; if this be secured, shallow tillage by scaling, scarifying, scuffling, skimming, or broad-sharing, is in many cases preferable to deep working oftener, and especially for wheat, which loves a firm bottom.

But with regard to the depth of breaking up grass-land, it should be considered according to the manner of performing the business, as by the process of paring and burning, and by that of merely ploughing. In regard to the first, it is nearly a general opinion in almost every part of the kingdom, that the first ploughing after the operation should be shallow. It cannot, however, be admitted, that though the notion be far spread, it is therefore just, as the same thing prevails every where with respect to dung and the sheep-fold; in which cases there is great reason to think it erroneous. Manures that purify, and of course become volatile, cannot be buried, as have been seen above: plough as deep as you please, they all rise sooner or later into the atmosphere; but with fossile bodies, and probably with the ashes of paring and burning, the case may in a great measure be different, and the good success of the usual management affords reason to justify the principle on which it proceeds. It may, therefore, be deemed a safe maxim not to plough after this operation for the first time, more than three, or at most four inches in depth. In the other mode of breaking up grass-land after much experience, the writer has not found much difference either in the produce or effects on gravelly,

clayey, or sandy loams when executed in either way. In districts where they usually plough as deep as six or eight inches, he has observed (and it has been his own practice) that they plough up old grass-land shallower, that is not above four inches deep, or at most five; the crop being every where put in upon this earth, except in the case of summer-fallowing peaty or moory lands. By not ploughing deep, the atmosphere has a more direct influence in assisting the putrefaction of the fod covered, as it is with the crop which is probably one of the smothering kind.

But that two circumstances are here to be attended to, which are the use of the skim-coulter plough, and that of sowing on a stale furrow.

This plough he considers as one of the most effectual and applicable implements for breaking up this sort of land. It is well known that when this is done by a common plough, there is a seam between every furrow-slice of grass and weeds that grow through the summer to the injury of the crop; but which is wholly prevented by this plough, which is applicable in all cases, except where there are roots or stones.

In regard to sowing on a stale furrow, it is a good practice in breaking up old ley, when done in soils that are not ticklish to get upon. On wet clays and loams, where not well drained, the business of sowing is often obliged to be delayed too late in the spring, if ploughed in the winter, in which cases it is safer to plough and dibble at once; but on other sorts dry enough, such as dry loams, sands and chalk, it is better to plough in autumn and plant early in the spring: the frosts and successive variations of weather, sweeten the freshly turned up soil, and crumble the surface enough to give a little mould, and not so much as to impede the person employed in dibbling.

But in all the heavy strong sorts of land a great improvement has been effected by ploughing the lands in the early autumn, so as to avoid as much as possible all spring tillage. In this way the summer fallows intended for barley and oat crops; the pea, bean, and tare stubbles which are to receive the same sorts of crops, as well as the white corn stubbles which are designed for any sort of spring crops, should at this season be ploughed in a careful manner in the proper form, so as to be the future seed earth, no further ploughings being admissible on any account. In this method, it is stated, in the Calendar of Husbandry just noticed, that the crops are much larger and the expense considerably lessened. The leading principle is this; if the land is so laid in autumn, on to ridges of that exact breadth which suits the tools, (whatever they may be, whether harrows, scarifiers, scufflers, or drills,) so that the horses which draw them may walk only in the furrows, the frosts will have left so fine and friable a surface, that any of these operations may be performed long before the land in the common system would be ploughed. The seed is usually in the ground before the old fashioned farmer thinks of moving. If he ploughs, he turns down a dry crumbling surface, and brings up the stiff wet *clung* bottom; if rain comes, then he is in the mire, and must wait for a season; if a drying sharp north-east wind comes, his furrows are converted to oblong stripes of a stony hardness. In one case he is plagued with mud, in the other with impenetrable clods; he was possessed of just the surface he wanted, and which, once lost, is not often regained. This surface may be scuffled, and immediately drilled securely. In this practice the lands or ridges should be laid out with great exactness and attention.

There are also other points that require attention in the ploughing of land; the furrow-slices should be disposed in a different manner, according to the nature of the grounds;

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the views of the farmer and the crops to be grown upon them, circumstances which have been already noticed in speaking of *ploughs*. The feed furrows, and those where advantage is to be derived from the effects of the atmosphere, should be laid much less flat than in other cases. The breadth of the furrow must likewise be regulated by similar circumstances. And there is another point that has been noticed by Mr. Kent, which is, that, on all the lighter sorts of soils, it is essential to preserve at the depth of from six to eight inches below the surface of the land, what in the language of farmers is denominated a *pan*, which is an unbroken bottom at such depth; in consequence of which, it is supposed, that manure may be kept longer in the top part; and that in such seasons as are very dry, the less deep this pan is, the less liable the grain will be to burn, especially where it consists of earth and not of rock, as the roots of the grain will find more moisture by striking against a body of compact earth, than in a greater depth of hollow earth, as the former obviously preserves more moisture in such dry seasons. There is also another advantage in this pan, which is, the having a less proportion of mould to work and keep in a state of fertility. In such cases, where deep ploughing is had recourse to, this compact bottom or pan must be broken and destroyed, for which a great deal more manure will become requisite to keep the land in proper condition for the supporting of crops. On these accounts, care should be taken in such cases, not to go so deep with the plough as to injure this firm earthy crust, and increase the difficulty of cultivating such soils. See PAN.

In regard to the frequency of ploughing lands, it must, in a great measure, be directed by the state or condition in which they are, and the nature of the crops which are to be grown upon them. It has been observed, in a late System of Practical Husbandry, that the stiff, clayey, loamy, and even chalky soils will, in general, stand in need of more frequent stirring, either by means of the plough, harrow, or some other implement, in order to separate and break down their tenacious particles, than those of the sandy or gravelly, and more light kinds, in which there is much less adhesion. Besides, where lands have been in a course of tillage for some length of time, whether they are of a clayey, loamy, or even sandy quality, they may require less frequent stirring than where the contrary is the case. And where the method of putting the seed into the ground by means of drill machines is to be had recourse to, a fine state of tilth will, in general, be indispensably necessary. But, the nature of the crop that is to be cultivated must, in most cases, direct the number of ploughings that may be necessary, as some demand a much finer state of tillage than others; though in most cases a well reduced earth is favourable. It has, indeed, been asserted by Mr. Tull, in his Horse-hoeing Husbandry, that the finer land of any kind is made by tillage, the richer, and more capable of supporting plants it becomes. A proof of which may often be met with in lands where a part has, from accident or other causes, been better tilled than the rest, as, though they be afterwards constantly managed in precisely the same manner, the part so treated always affords better crops than those which have not had the advantage of such tillage.

And where the nature of the crop is such as to be greatly retarded and injured in its growth, by the occurrence of other plants, as in wheat and barley, the land will constantly require to be rendered fine and mellow, either by frequent stirring by the plough, or the growing of such preparatory crops as have a tendency to bring it into a friable and clean state, by the shade which they produce, and the repeated tillage and culture which they receive

while growing. Also, where such plants as produce large, knobby, or tap roots, in or upon the soil, are to be grown, it will be necessary to have the land well broken down, and rendered mellow by repeated turning over, in order that they may more readily push down, or extend themselves in other directions. It has likewise been found, that a fine state of tilth is always the most favourable for affording the nourishment and support of crops in a free and equal manner, both on account of its admitting the fibrous roots of the plants to spread and extend themselves with more facility, and the manures to become more minutely divided, and more intimately blended with the soils; as well as from the substances that constitute the food of the plants being more readily and more copiously formed by the chemical combinations and decompositions that take place under such circumstances. And further, by means of such degrees of pulverisation and mellowness, the seed, especially when it is of the smaller kind, is not only more equally and more perfectly covered, but its vegetation more quick, from its becoming more fully in contact with the mould, and from the moisture being more minutely diffused and retained in the ground, which is an advantage of much importance in the cultivation of many sorts of crops.

The work of ploughing may, in most cases, be well performed with any of the light well formed ploughs that have been described, with two horses without a driver, being managed by reins by the ploughman; and where double ploughs are employed, three horses may mostly be sufficient for effecting the purpose, being directed in the same manner; though in the usual method of performing the work, with the common awkward ill-formed ploughs, in practice in many places, three, four, or more horses are in general made use of, and the business executed with more difficulty and less dispatch. The advantage of having recourse to the improved sorts of ploughs in this expensive sort of work, must, of course, be extremely obvious. It has been stated, in the third volume of Communications to the Board of Agriculture, that it has been lately found in Lancashire, that in a light loamy sort of soil, Small's plough with two horses abreast, and the ploughman driving them by means of reins, is capable of executing its work with equal expedition, and to a better depth when necessary, than the common ploughs of the district with four horses, a ploughman, and a boy as driver. This great advantage is considered as depending upon the excellence of its construction, and the team possessing the greatest purchase in the draught, by being placed so near the plough; the least variation in the formation or proportional distances of the different parts being, however, capable of destroying the effect. The Northumberland or Cumberland, and the Rotherham ploughs are also found equally valuable.

Having taken this view of the nature of performing this important operation in the cultivation of land, it may be useful to state the facts as they have been collected in the best arable districts of the kingdom, by the surveyors employed by the Board of Agriculture. In West Norfolk, as stated by the secretary to the Board, there is much difference in performing the work. On some farms he has remarked, the furrow to be cut flat and clean; but, on others, *wrist-baulked*, by tilting the plough to the left, which, raising the share-fin makes that inequality, and is partly the occasion of his having found so many ploughs at work, which would not go a single minute without holding. In East Norfolk, Mr. Marshall has observed, that the ploughman, to prevent the soil when moist from turning in whole glossy furrows, which they term "scoring," ties a piece of strong rope yarn round the plate or mould-board, which by these

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means is prevented from acting as a trowel upon the soil. And Mr. Young found this the practice at present; but was informed, that it was not so generally wanted as formerly, which they attributed to better constructed *plates* or mould-boards.

And in relation to the depths of ploughing, he states, that Mr. Thurtell, at Gorlstone near Yarmouth, has a great opinion of deep ploughing. Three or four inches are a common depth about him, but when land is clean he always ploughs five, and sometimes six or seven; he is careful, however, not to do this on foul land; he has no apprehension of breaking the pan, having many times gone deep enough for that without any inconvenience, and as to bringing up a dead soil he has not seen any ill effects from it. The land on which this practice has been pursued, is a good sandy loam on a clay marl or gravel bottom. But Mr. Everitt, of Caistor, is of a different opinion; he is not fond of deep ploughing; he thinks four inches deep enough: his ideas on this subject, however, seem, Mr. Young says, to have been chiefly the result of a trial made by his father, who broke the *pan* by trench-ploughing a piece of land, which has ever since been full of charlock, &c. The difference of their soils will not, he thinks, account for this opposition of sentiment. Gorlstone is a very good sandy loam at 20s. or 25s. an acre, though certainly inferior in depth and goodness to the land at Caistor. In discourse with these two gentlemen on this subject, Mr. Everitt remarked to Mr. Thurtell, that if he ploughed deeper than common, he ought to add manure proportionably to the quantity of soil stirred; an old idea of his, and he remembers well, combated by his friend Arbuthnot. It is added, that Mr. Francis, of Martham, ploughs four or five inches deep: and Mr. Cubit, of Honing, on a fine sandy loam, always as shallow as possible; and at East Ruston, where the soil is exceedingly good, the same; he thinks a smaller quantity of muck by this means answers. But they do not plough four inches deep at Scotto; Mr. Dyble remarked, it is observed, that a piece was there ploughed five or six inches deep, and damaged for seven years; three inches enough; the soil much of it a fine sandy loam, manifesting no want of depth. Mr. Palgrave, at Collishal, however, applies deep ploughing in one case with singular judgment; he brings by water from Yarmouth large quantities of sea ooze, or haven mud; this, on dry scalding gravels and sands, he trench-ploughs in without fear of burying, and finds, on experience, the effect very great, forming thus a cool bottom, so that the surface burns no more. And Mr. Johnson, of Thurning, thinks that it is common to plough too shallow; nor does he believe that any mischief results from depth. He has made a ditch one year, and thrown it down again the next, and the benefit was seen for seven years, without the soil being acted on by draining, or wanting it; nor is he nice to have his muck ploughed in shallow, having no fear of burying it. By ploughing a good pitch for turnips, they come slow to the hoe, but when they do get hold, thrive much faster than others. He also finds Mr. Reeve, of Wight, an advocate for deep ploughing; he goes five inches deep; if he did not he should get no turnips. And Mr. Durgate approves of deep ploughing; remarking, that he breaks up his *ollonds* deeper than most people. Mr. Willis observing the marl on his land was sunk below the common path of the plough, turned it up again by going a deeper pitch, and found it to answer nearly as well as a new marling; and he suffered no inconvenience. It is added, that the two-furrow work about Holt, &c. is to turn a furrow on lay or *ollond*; the plough then returns and throws it back with the untouched

land that is under it, into the former open furrow, and overlapping that, rests on the baulk left beside it. It is also observed, that Mr. Money Hill, in breaking up the strongest land he has, ploughs deeper than on the lighter; that is, four inches, and on light three and a half; and on that depth drills on flag; if twitch in the land, ploughs only three and a half; if beyond the usual depth, would hurt the crop and give weeds. Waterden is a thin and stony soil. It is remarked, that Mr. Hill's father lived for many years at Gatefon, and was succeeded in the farm by Mr. Parker. Mr. Hill's last crop yielded 400 lafts of corn, above 320 of which were barley. He generally ploughed four inches deep, and never more than four and a half. Mr. Parker in the first year ploughed the second barley earth seven inches deep, sowing about eight score acres (the common quantity twelve score.) He sold that year but twenty lafts; the feeds also were worse than usual; the wheat that followed, good; but in general, he had indifferent crops for fourteen or fifteen years. And in March he applies what he calls *one-furrow* work to a foul stubble, if he has such by chance; the land side horse (that on the left hand) always, after the first furrow, returns in it; it is left open; harrowed down with a heavy harrow; then the weeds gathered and burnt, and the next ploughing given across. Norfolk Corrected Agricultural Report.

The Agricultural Report of Hertfordshire states, that the common depth of ploughing about Westmill is four or five inches; but Mr. Greg ploughs as deep as the staple will admit; which account of his bailiff implies, that five inches are not the depth of the staple. The crops in that vicinity are so great, that the writer should suppose that there cannot be any material error in the basis of their practice. And Mr. Whittington remarks, that winter tillage is but of little use; he avoids it as much as possible, and has found that the application of a break, or a large four-horse harrow, is a good substitute for some ploughing.

With regard to the strength of team which is necessary, it is stated by the author of the Norfolk Report, that Mr. Thurtell, through the summer, ploughs with three horses two acres a day, one always resting: this from finishing sowing spring corn to the end of the turnip tillage. There is no doubt of their ploughing with ease an acre in four hours and a half. And in the clays of Marshland, all are foot or swing-ploughs; never more than two horses used: they do an acre a day, and in summer one and a half at two journies. And at Remsby, each pair of horses two acres a day at two journies.

About thirty years ago, the common price of ploughing was 2s. 6d. an acre, in every part of the district, except Marshland: it is now 4s.; in some places 3s. 6d. Mr. Young adds, that the farmers in every part of it get more land ploughed in a day, by their own men and horses, than on any similar soil in any other part of the kingdom; which, he thinks, is not altogether to be attributed to the merits of the plough, though it is certainly a good one, nor to any superior activity in the horses: the cause is more in the men, who have been accustomed to keep their horses and themselves to a quick step, instead of the slow one common in almost every other district of the island.

And the Suffolk Report states, that in every part of the county this sort of work is done with a pair of horses, conducted with reins by the ploughman; and the quantity of land usually turned in a day is an acre upon stiff soils, and from one and a quarter to one and a half on sands. And it is added, that the ploughmen are remarkable for straight furrows, and also for drawing them by the eye to any object, usually a stick whitened by peeling, either for water cuts,

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cuts, or for new laying out broad ridges, called there *slashes*; and a favourite amusement is ploughing such furrows, as candidates for a hat, or pair of breeches, given by ale-house keepers; or subscribed among themselves, as a prize for the straightest furrow. The skill of many of them in this work is remarkable. Such a mode should be practised in other districts of the kingdom.

In the Hertfordshire Report it is remarked, that the price of ploughing about Hatfield amounts to 11s. and 12s. an acre; twenty years ago, 7s. were paid; all is done with four horses and a driver: 20s. *per acre* have been paid in the new inclosure at Cheshunt. And that in the 17 acres of experiment ground of the marchioness of Salisbury, the cultivation was began by a powerful trench ploughing, 18 inches deep. Mr. Stephenson, the manager, who, having been bred a gardener, had the farmer's best education, knew that her ladyship intended to cultivate parsnips, carrots, cabbages, and other plants-demanding deep tillage, and very wisely began on garden principles. He remarks, that in general, in Hertfordshire, there is a deficiency in not ploughing to a greater depth: they have a prejudice against it, and think land ruined that is stirred deeper than common. It is admitted that the first crop will sometimes suffer in spots, but the succeeding ones make ample amends. Barley has been sown on trench-ploughing, and with success; in a dry season it grew well, while that for which the land had been indifferently prepared stood still.

Mr. Pratchet of Hatfield having asserted that he would readily give for ploughing his land once over 12s. *per acre*, and that he was sure it cost him more, put down the particulars on which he founded his opinion, and his calculations are these:

### Expences *per Week*.

	£	s.	d.
Four horses, seven bushels of oats, at 4s.	-	1	8 0
Eight trusses of hay, at 5s.	-	1	2 2
Ploughman	-	0	15 0
Driver	-	0	12 0
Wear and tear, plough and harness	-	0	6 0
	-	4	3 2

It is added, that they plough five roods *per day*, when they break up their land, and one acre and a half when they give it a second, or any subsequent ploughing; and that at seven acres and a half *per week*, the expence amounts to 11s. and 1d. *per acre*, besides the wear of the horses; at nine acres, it amounts to 9s. 2½d. But the above estimate of Mr. Pratchet is drawn from the consideration, that this includes none of the time when the horses are unemployed, which is a very material point, and adds largely to the expence when they work; on a wet-land farm particularly, the time thus lost is considerable.

Mr. Cook, from near Colchester in Essex, bailiff to the duke of Bridgewater, is of opinion, however prejudiced in favour of two-horse ploughs, that they could not break up for a fallow the stony clayey loams of this county; but that, after one ploughing, they are fully equal to the following tillage. And that about Hitchin, they break up with the common Hertfordshire plough; but in stirring, use the swing-plough with three horses, and sometimes with two. And that at Mortgrave, near Hitchin, where Mr. Green is settled, who came from Clare, in Suffolk, about four years ago, this farmer never uses more than two horses in a plough, and does his work just as well as the

natives with four: he succeeds, and is supposed to be a very thriving man. Some of his Suffolk ideas, however, are, Mr. Young observes, said not to have answered so well, particularly the making composts with ditch earth: this he has given up, and now goes to London for manure, like others. And Mr. Sedgewick recommends a practice in ploughing broad lands with the common plough, to leave two or four furrows for the small narrow plough, to finish the lands; by which means, there are channels on the slopes of the open thoroughfs to catch seeds; whereas, with the great plough, the seed rolls into those thoroughfs. But Mr. Parker of Munden uses the foot-plough of Middlesex, as preferable to the great Hertfordshire wheel-plough, and can break up stony strong land with it as well as the other performs it. Cases very rarely happen, in which the country plough has the advantage. He has a great opinion of deep ploughing; never has the least objection to any depth, nor ever yet checked his men for going too deep. His common depth is nine inches. This he has practised 23 years on good loamy land in Huntingdonshire, and here on the gravels and flints of Hertfordshire. He has never lost a crop by it, but met with an unvarying success; and is clearly of opinion, that at this time of day it ought not to be made a question, but received as an admitted fact. He does not limit his ploughs to nine inches, for he would like twelve better, if easily attainable. It is added, that he has no idea of burying dung, but ploughs it in nine inches deep, and would plough it in deeper; for he is well assured from experience, that nothing is lost: and a great advantage of depth is, that one ploughing, given deeply and clean, is of more effect and better than two, or even than ten, such scratchings as are called ploughings often in this county; but the harrows in *cleaning* should, on loamy soil, be as deep as the ploughing. Mr. King of Barkway, it is remarked, who has Suffolk connections, ploughs with a pair of horses and no driver, and does as much and as well as his neighbours with four.

On their moist retentive clays at Albury they are extremely attentive never to go on in wet weather: the soil is stiff and ticklish, and if touched when too moist, is greatly injured. This is a fact which is very general in moist parts of the kingdom, on such lands.

In every part of Hertfordshire they have a method of ploughing, of which they are very fond, called *combing*, or *backing*. A field that lies on flat or broad lands is half ploughed across, by beginning with a furrow, and returning; the plough doubles the breadth of it by a second furrow, the contrary way from the former, leaving a very small baulk, just sufficient to give steadiness to the plough, by a purchase against the unstirred land, which is equally well effected by leaving no baulk, but by going two inches deeper on the land side. Then the plough, returning for the third time, throws back the last turned furrow, taking up earth enough under it to clean plough the whole land, if wanted, or to do it at such spaces as to whole plough, or half plough the field; but if combed close, the surface is left in regular narrow ridges, called combs. This operation, with a little difference in the execution, is called *ribbling* in Suffolk. It appears a good hold for the harrows. The writer of the Hertfordshire Report saw it well executed at Sir John Seabright's, at Beechwood, who understands the Hertfordshire tillage well. And *bouting*, as it is called, is the lapping of two furrows together, by forming narrow ridges, a bout in each; then they are reversed in the same manner by splitting; after that, they plough down by one furrow in the centre of the ridge, and so leave it for har-

## PLOUGHING.

rowing: some time elapses between each operation. In breaking up, they do an acre a day, and sometimes more.

It is stated in the Corrected Report of the County of Essex, that the ploughs which are employed there are both those of the swing and wheeled kinds; the latter generally on dry land, and the former on wet: but that in some districts, swing-ploughs are used on all soils. That in general the plough-team is two horses, driven by the ploughman by means of a cord; and that a common addition is a perpendicular iron fastened to the beam, with two holes to keep the cord from entangling with the plough or whippetrees. But that upon strong land, three horses abreast are not uncommon, when the work is hard, though still without a driver. Further, that the usual day's work is an acre; at busy seasons, and for good managers, five roods are sometimes done. Scarcely any common farmers use oxen; there are such cases, but they are very few: some gentlemen have them. The ploughing is in general extremely well performed in this county, which abounds with skilful and accurate ploughmen. The reporter has walked over 40 acres of wheat fresh put in, eyeing the land carefully, and not discovering a single false furrow; no variations in the breadths of the stiches, or of the furrows; no depressions, nor any variations in the curvatures of the stiches. But they do not plough so deep as in Kent, nor so flat as in Norfolk; nor is it their wish to do so. The number of ploughings for different crops are in most places great, as from four to eight, or more; and as to the depth of ploughing, some prefer it when done deep, others when more shallow. In the island of Foulness, they break up for fallows six to seven inches deep; but some farmers shallower. Mr. Vassal of Eastwood, in Rochford hundred, ploughs eight or nine inches deep; and Mr. Wood, who managed Rochford-hall, after the death of the late Mr. Wright, trench-ploughed several fields, which were the worse for it, relative to the wire-worm. The present Mr. Wright ploughs his fallows only a fair depth, and is convinced that it is better, as he has had much better crops from shallow tillage. A neighbour of his, after ten years of deep ploughing, got at first nothing from it but weeds and wire-worm. Wild oats abounded much. He left off the practice, and then got much better crops.

At Little Wakering, Dr. Asplin, and many others, plough the first earth of a fallow very shallow, and get deeper every time; other earths, not in fallowing, shallow. But as to the depth of ploughing for fallows, it must depend upon the soil; but the best farmers like to go deep enough to chip up the dead soil now and then, and shew it a little upon the surface, after all is finished.

In the work of ploughing here, some think the laying the furrows flat the best; but others prefer feather-edged furrows, as covering the seed better in harrowing: and this is the more general opinion. At Burnham, Mr. Ketcher does not approve of feather-edged ploughing; and he thinks flat furrows best on wet land, as well as on dry. But Mr. Tabrum, at Margaretting, not only approves feather-edged work, but thinks it essential for giving moulds to cover the seed.

In regard to the expence of ploughing in this district, in all the strong rich clays at Bradfield, and around by the coast to Clackton, it is 8s. an acre. On the wet loams at Dunmow, three horses, a man, and boy, for the first and second earths of a fallow, by the acre, 7s. At Snorum, from 8s. to 9s. each ploughing; the soil very stiff. Mr. Rusli, at Latchingdon, gives 9s.; at Rochford, 10s. 6d.; at Raleigh it was formerly 5s., is now 8s.; at Thorndon,

10s.; at Margaretting, the common hiring price is 10s. 6d.; and at Toppesfield, Mr. Eley reckons it worth 8s. with three horses; 6s. 6d. with two. They plough barley-fallows five or six times.

At Little Wakering, Dr. Asplin used formerly to contract with one labourer for all the tillage of his farm, at 2s. an acre for ploughing, 6d. for harrowing, and 2d. for rolling. More work was done, always five roods ploughed *per* day, but he left it off on account of the shallowness and wide furrows.

At Jetworth, in Oxfordshire, according to the report of that district just published, they plough with four horses, and do an acre a day. In the south-eastern division of the county, a party of farmers agreed that an acre is the general quantity that should be ploughed in a day by a team; but many ploughs go out for three roods. The expence was thus reckoned.

	£	s.	d.
Four horses, $1\frac{1}{2}$ cart. of hay per week, at 4s. 6d. each	1	4	0
One bushel of oats <i>per</i> horse, at 3s. 6d.	0	14	0
Chaff, 2s. <i>per</i> week	0	8	0
Decline of value	0	4	0
	2	10	0
<i>Per</i> diem	0	7	1 $\frac{1}{2}$
Wear and tear	0	2	6
Man and boy	0	2	6
	0	12	1 $\frac{1}{2}$

However, on casting up the account, they observed that it was too low, for an acre of land could not be ploughed under 14s.

At Wormsley, &c. horses are allowed 20lb. of hay *per* diem, and a bushel of oats *per* week; more for extra work. They plough with three or four, and do an acre a day. Three and four horses are likewise employed in most other places, but some have tried two, though this is only seldom done. The same quantity of land is usually ploughed in the day.

About Adderbury, it has been agreed by several very good farmers, that it is right to plough a stubble in autumn for a fallow, deep; five inches considered as deep ploughing. Also at and about Thumley, they are of the same opinion, when they break up for the first time in May. Mr. Edmonds thinks, that beans do best on deep ploughing; but the after crops may suffer for want of due tillage being given to such additional depth. If deep, it should be continued. Mr. Cozins, of Golder, ploughs eight inches deep for beans, and also in the first ploughing for a fallow. Mr. Newton, of Crowmarsh, likewise ploughs deep for beans and turnips; but thinks that clover land cannot be ploughed too shallow for wheat. At Mungwell, the bishop of Durham ploughs for the most part according to the staple of the ground, which is very shallow. He generally goes as deep as the staple will admit. His lordship gained exceedingly by ploughing one inch deeper than the farmer before him had done; and which has gradually become an addition to the staple and the soil.

Mr. Percey thinks, that they are apt to plough too much; the less they plough their land the better. A good farmer will plough enough to keep it clean, and all beyond that is bad. Hence, it is supposed, that land may be ploughed too much.

On the rich sands at Adderbury, they do not plough more than four inches deep at any time, except on the little clay land they have, at the first breaking a fallow.

Mr. Davy of Dorchester ploughs as deep as he can for beans; but as shallow as possible on clover lays for wheat.

The rates of ploughing in most of the other districts, both in the south and the northern parts of the kingdom, stand equally high with these; and in some they are considerably higher, as more strength of team is employed.

There are many other modes of ploughing practised in different counties, but it is not necessary to describe them here. See TILLAGE.

**PLOUGHING in Green Crops**, the process of turning down various sorts of vegetable crops in their green or moist succulent condition. It is a method of practice that has been employed for a great length of time on the continent, though little practised here by the farmers. The reason of which is probably, that the soils are in most districts too wet and heavy for its being had recourse to with advantage; the light and more friable kinds of land are most adapted for improvement in this way, as in such the green materials undergo decomposition much more readily, and become more quickly in the proper state for affording the support of crops. In some clayey soils, the putrefaction of such materials is retarded in such a way, that little or no benefit can be derived from their use. But in suitable soils, crops of the green kind, such as buck-wheat, tares, clover, rape, and where sown for the purpose, pease or beans, &c. may be used with advantage, being turned in as a preparation for wheat-crops, without the expence of a fallow. Where employed in this way, the crops, as observed above, should always be turned down when in their most luxuriant state of growth, and the soil rather dry, in order that a speedy decomposition and decay may be undergone. It has been suggested, that advantages may be gained in this view, by the application of small proportions of calcareous substances in their caustic or more active state over them before they are turned down. And that the economy of this practice must chiefly depend upon the savings in cartage, and the labour of preparation, which in other sorts of manure is often very heavy. Mr. Young, in his Survey of Lincolnshire, states, that this practice, after having been attempted, appears to have been given up from its not fully answering the purposes for which it was intended, probably for the reasons stated above. But it is a mode of husbandry that Mr. Donaldson states to have been had recourse to with success in Warwickshire, and which he considers as, beyond all others, the most economical. The expence of the seeds is almost the whole of what attends the practice. It is now little had recourse to any where.

In the county of Essex, Mr. Hardy, of Bradfield, had a field of clover, part of which was mown twice, and part but once; the second growth being kept until it was in blossom before feeding, when hogs, &c. were turned in, who trampled down five times as much as they ate, which was ploughed in for wheat: and where this latter management took place, gave by far the flouter wheat: and it is said, that it should be remarked that through all the parts of Tending hundred, this husbandry of trampling second crop clover apparently to waste is very general, and the opinion entertained of its merit is high. Lord Braybrook sows cole for ploughing in November, and his bailiff, Mr. Nockold, assured the reporter that he could see to an inch in the barley where this management takes place. If the crop be high he mows it first, but this is for want of a skim-coulter, which would do it better standing. Mr. Clayden, a very spirited tenant on the Audley-End estate, is in the same hus-

bandry. Corrected Agricultural Report of the County of Essex.

Ploughing in green crops is frequently practised by some of the best farmers bordering on the White-horse hills, in Berkshire, and found much less expensive than carrying dung from the yard. Vetches, buck-wheat, rye, &c. are there chiefly employed for this purpose. Corrected Berkshire Report.

**PLOUGHMAN**, in *Husbandry*, the person who guides the plough, in the operation of tilling or tillage.

**PLOUGHMAN'S Spikenard**, the English name of a genus of plants called by the botanists *conyza*; it is likewise called by us *flca-bane*. See CONYZA.

**PLOUGUENAST**, in *Geography*, a town of France, in the department of the North Coasts, and chief place of a canton, in the district of Loudeac; 7 miles N.N.E. of Loudeac. The place contains 3189, and the canton 12,503 inhabitants, on a territory of 132½ kilometres, in five communes.

**PLOUGUERNEAU**, a town of France, in the department of the Finisterre, and chief place of a canton, in the district of Brest; 13 miles N. of Brest. The place contains 6430, and the canton 15,033 inhabitants, on a territory of 152½ kilometres, in 6 communes.

**PLOUHA**, a town of France, in the department of the North Coasts, and chief place of a canton, in the district of St. Brieuc; 12 miles N.N.W. of Brieuc. The place contains 4145, and the canton 10,756 inhabitants, on a territory of 125 kilometres, in 8 communes.

**PLOUZEVEDE**, a town of France, in the department of the Finisterre, and chief place of a canton, in the district of Morlaix; 8 miles S.W. of St. Pol de Leon. The place contains 2364, and the canton 11,436 inhabitants, on a territory of 130 kilometres, in 6 communes.

**PLOWMAN'S ISLANDS**, a cluster of islands, forming a part of Chu-san islands (see CHU-SAN), which are inhabited, and contain several spots of beautiful verdure; but not a single shrub, except a very few dwarf fruit-trees, oak, and Weymouth pine. The rocks on these isles are of the same nature with those of the Ladrões; with the addition, in some parts, of perpendicular veins of white, and of blue and white spar. The Lion, one of the ships belonging to lord Macartney's embassy, moored between the Plowman and Buffalo's Nose islands: and found a most excellent harbour, secure from all winds, and the holding ground so good, that it required the whole strength of the ship's crew, with the assistance of every purchase, to weigh the anchors: the depth of water being from 12 to 22 fathoms. The tide rises about 12 feet, and runs at the full and change of the moon, 2½ miles an hour. Its latitude is 29° 45' S., and longitude 121° 26' E. The ship was supplied from these islands, at moderate rates, with bullocks, goats, and fowls; and from some of the surrounding boats with a variety of excellent fish. Staunton's Emb. to China, vol. i.

**PLOWS**, in *Agriculture*, a provincial term signifying ploughed ground, either in clover or open fields.

**PLUCHE, ANTONY, Abbé**, in *Biography*, an elegant writer, was born at Rheims in 1688. Having passed through the usual course of education, he was appointed professor of humanity in the university of his native place, and two years afterwards of rhetoric, at which time he entered into holy orders. Some years afterwards he went to Paris, where he gave lectures in geography and history. In that capital he acquired a name among men of letters, by his popular work entitled "Spectacle de la Nature," of which the first volume appeared in 1732, and which was carried on to nine volumes. It contains a view of the most interesting facts in natural history,

history, as they were then known, in the form of dialogue. The dialogue is not well kept up, though few works have been more read, and it was translated into various languages. His next publication was "Histoire du Ciel," in two vols. 12mo., of which the first volume is chiefly mythological: the second relates to the formation of the world, and concludes with a confirmation of the Mosaic account of the creation. In 1750, he published a treatise, entitled "The Truth of the Gospel demonstrated." As a philologist, he is distinguished by his "Mecanique des Langues, et l'Art de les Enseigner," which is said to be a very useful and judicious treatise. He died in 1761, at the age of 73, leaving behind him the character of a truly virtuous and respectable man. Two of his posthumous pieces were published after his death, entitled "Concorde de la Geographie des differens Ages;" and "Harmonie des Pfeumes, et de l'Evangile."

PLUCKART BAY, in *Geography*, a S.E. branch of Loch Ewe, on the W. coast of Scotland. N. lat.  $57^{\circ} 45'$ . W. long.  $5^{\circ} 34'$ .

PLUCKENIN, a town of America, in Somerset county, New Jersey; 28 miles N. of Princeton. It carries on some trade.

PLUDENTZ, a town of Germany, and capital of a county of the same name, situated on the Ill. In 1533 it was almost destroyed by an earthquake, and in 1638 was wholly burnt down; 62 miles W. of Inspruck. N. lat.  $47^{\circ} 3'$ . E. long.  $9^{\circ} 8'$ .

PLUDESCH, a town of Germany, in the county of Pludentz; 6 miles N. of Pludentz.

PLUE, LA, or *Rainy Lake*, a lake of Upper Canada, lying W. by N. of lake Superior, and E. by S. of the lake of the Woods. The Narrows are in N. lat.  $49^{\circ} 3' 2''$ , Fort lae la Plue in  $48^{\circ} 35' 49''$ , island Portage,  $50^{\circ} 7' 31''$ , at the Barrier,  $50^{\circ} 7' 51''$ . W. long.  $95^{\circ} 8' 30''$ .

PLUE, LA, a river forming a communication between lake La Plue and the lake of the Woods.

PLUG, a large wooden peg, with which to stop the bottom of a cistern, cask, pipe, or the like.

PLUG, in *Ship Building*. *Haufe-plugs* are pieces of timber trimmed to the size of the haufe-holes, so as to keep out the water. *Shot-plugs* are formed like the frustum of a cone of various sizes, in proportion to the holes made by the different sizes of shot which may penetrate the ship's sides in time of action. The latter are sometimes made of tallow and junk, or oakum, made hard together, and are thrust or driven into those shot-holes, to prevent leaking: accordingly they are always ready for this purpose.

PLUKENET, LEONARD, in *Biography*, "a learned, critical, and laborious botanist," as Dr. Pulteney justly denominates him, was the contemporary and rival of PETIVER, see that article; and laboured, with still more ardent, as well as exclusive, assiduity, to collect and to delineate the vegetable productions of nature. His origin and native country, as well as the place of his education, are unknown. He has indicated 1642 as the date of his birth, and we know that he survived the sixty-third year of his age, but there is no precise record of his decease. A handsome portrait of him, at the age of forty-eight, is prefixed to his *Phytographia*, with the title of Doctor of Physic, and his arms; ermine, a bend dexter engrailed, gules. It is not known where he took his degree. His name seems to betray a French extraction, *plus que net*, and has been latinized *plus quam nitidus*. He resided in Old Palace-yard, Westminster, where he appears to have had a small garden; but as Dr. Pulteney sought in vain for his name, in several lists of the College of Physicians, printed in the first years of the 18th century, as well as in those of the

Royal Society, of the same date, it should seem that he was not then eminent, either as a medical practitioner, or a natural philosopher. His motto, an anagram of his name, *ut pené nullus sic ardeo*, well expresses the zeal with which he devoted himself to his favourite study; while another motto in the same page, over a burning candle, *aliis inferviendo consumor*, and a subsequent one, to the fourth part of his work, *nil nisi premia desunt*, evince that his worldly recompence was not adequate to his wishes or expectations. Dr. Pulteney has discovered that Plukenet had a son Richard, who was a student at Cambridge in 1696; and the *Almagestum* contains some verses written by another son, Robert, at Eton school; which is all we know of his family or connections. He published his early works at his own expence, but was assisted afterwards by trifling subscriptions. Towards the close of his life he is said to have experienced royal patronage, to have obtained the superintendency of the garden at Hampton-court, and the title of Royal Professor of Botany; all from the favour of queen Mary. Three of the sections of his *Phytographia* are severally dedicated to bishop Compton, the first earl of Portland, and king William III. That he enjoyed the friendship of Uvedale, who was his fellow-student; and the high commendation of Ray; are sufficient proofs of his personal and scientific merits. The beginning of the *Almagestum* testifies his elevated piety, which at the end degenerates into the orthodox style of the day. That he was skilled in the learned languages, and that his correspondence was very extensive, appears from almost every page of his works; and there are many particular parts which shew his researches to have been deep, and conducted with considerable ability. It is to be lamented that some of his latter pages betray a severity of stricture, on the literary labours of Sloane and Petiver more especially, of which we have already spoken in the life of the latter, and of which mere may be said hereafter when we come to speak of Sloane. Plukenet was, apparently, a man of more solid learning than either of those distinguished writers, and having been less prosperous than either, he was perhaps less disposed to palliate their errors. As far as we have examined, his criticisms, however severe, are not unjust.

These are all the circumstances we can find, illustrative of the life or character of Plukenet. We shall now offer a few remarks upon his works.

Having collected a vast Herbarium, for the time in which he lived, not only by means of his various correspondents, but also from the treasures that were then daily pouring into the gardens about London, his object was to publish a catalogue of the whole, accompanied by figures of the new or rare species. The first part of this design was executed in his *Almagestum Botanicum*, which, like all his other publications, is in quarto, making a handsome volume of 404 pages, dated 1696. Its arrangement is alphabetical, according to the generic names at that time received, and adopted from Bauhin and other old authors, though not without many corrections and alterations made by himself in this department. Each plant is distinguished by a specific definition, either adopted in like manner from his predecessors, or new-modelled by himself; and all the synonyms he could collect are subjoined. No ideas of systematical arrangement seem to have entered into his contemplation, at least in the plan of this work. There are passages in his writings which shew he had occasionally thought on that subject, nor could it altogether escape a man of so much reading; but it was by no means one of his primary objects. These were rather specific distinctions of plants, their synonyms, and their history. This work is  
said

said to contain about 6000 species, of which its author supposed 500 to be new. Of those 6000, many are now considered as varieties, being merely differences founded upon colour, or on double or single flowers; but if Plukenet erred in these particulars, he erred in common with all the botanical world at that period.

The *Phytographia* of our author was anterior in date to the above work, and yet is rather to be considered as an accompaniment of the *Almagestum*. It consists of 350 plates, engraved by various hands, each plate containing figures of five, six, or more, plants, chiefly, if not altogether, done from dried specimens, with various degrees of merit. If these figures seldom rise to any great excellence of botanical precision, they are at least original, and not only free from the faults of copies, so copiously displayed in the plates of Morison and such authors, but also tolerably exempt from gross mistakes of their own. Of their beauty little can be said, but the work improves as it advances. Being so generally cited by succeeding authors, especially Linnæus, it is indispensable to every botanic library. This book came out in four parts, of which the first and second were published in 1691, the third in 1692. The plates of these have the names, and many synonyms, of each plant engraved at the bottom. The fourth part, which commences with tab. 251, and was published in 1696, wants this useful appendage, and most of its figures are destitute of any reference. They are however cited in the *Almagestum*, and some of them likewise refer to that work; but in so obscure and difficult a manner, that few persons take the trouble of searching them out, or of citing them correctly in their own publications. Those who investigate the matter, will find several plants, supposed to be of recent introduction and hitherto nowhere delineated, which were known to Plukenet; though his references are often so faulty, as to damp our ardour of enquiry, by the needless difficulties they throw in our way.

In 1700 appeared the *Mantissa*, or appendix to the *Almagestum*, consisting of 192 pages, with a copious index to both works. This publication comprehends above 1000 new plants, with numerous observations and corrections relating to the former. Some of Plukenet's criticisms display great learning; as what concerns the Gopher, or Juniper tree, of the bible, first book of Kings, chap. xix. ver. 4; though he errs in referring the Barbadoes Juniper to this oriental plant; see his *Mant.* 109. Commentators have not been sufficiently attentive to botanical geography, on many occasions.

In 1705, Plukenet published his last work, the *Amalthæum*, which is a supplement to the other two, and composed on the same plan, consisting of 216 pages, with an index, and 103 plates, some of which illustrate the plants of the *Mantissa*.

All these works were republished, with new title-pages, in 1720, and again, with a re-impression of the letter-press, in 1769, making four volumes all together. Giseke published a very incomplete Linnæan index to them at Ham-burgh in 1779. The herbarium of Plukenet, containing about 8000 plants, having been bought by sir Hans Sloane, is now in the British Museum. The original manuscript of his works was given by the late Mr. Hudson to the writer of the present article. Pulteney's *Sketches of Botany*. Plukenet's Works. S.

PLUKENETIA, in *Botany*, was so named by Plumier, after Leonard Plukenet, M.D.; see the preceding article. Linnæus, in his *Critica Botanica*, p. 80, draws an analogy between the great singularity of structure in the flowers, and the peculiarity of Plukenet's character as a botanist;

which idea does not seem to us so happy as many of our great master's comparisons. Plukenet's works have no remarkable eccentricity about them, but are, on the contrary, plain matter of fact, interspersed with laborious, but sober, criticism.—*Plum. Gen.* 47. t. 13. *Linn. Gen.* 501. *Schreb.* 652. *Willd. Sp. Pl.* v. 4. 514. *Mart. Mill. Dict.* v. 3. *Sm. Nov. Act. Upfal.* v. 6. 1. *Ait. Hort. Kew.* v. 5. 324. *Juss.* 392. *Lamarek Illustr.* t. 788.—Clafs and order, *Monocia Monadelphica*. *Nat. Ord. Tricocca*, *Linn. Euphorbia*, *Juss.*

*Gen. Ch.* Male, *Cal.* Perianth of one leaf, in four deep, ovate, acute, equal, spreading segments. *Cor.* none. *Stam.* Filaments numerous, about 20, united in an imbricated manner, awl-shaped, very short; anthers small, smooth, of two tumid furrowed lobes.

Female, on the same plant, *Cal.* Perianth inferior, of one leaf, in four deep, ovate-lanceolate, acute, equal, spreading, permanent segments. *Cor.* none. *Pist.* Germen superior, four-lobed, depressed, smooth; style very long, cylindrical, declining, four-cleft at the summit; stigmas four, capitate, globose. *Peric.* Capsule four-lobed, coated, depressed, smooth, with dilated angles, of four cells, and eight elastic valves. *Seeds* solitary, large, compressed, with veiny wrinkles.

*Eff. Ch.* Male, Calyx in four deep segments. Corolla none. Stamens numerous.

Female, Calyx in four deep segments. Corolla none. Germen superior. Style simple. Stigmas four, capitate. Capsule four-lobed; cells elastic, with solitary seeds.

1. *P. volubilis*. Twining Plukenetia. *Linn. Sp. Pl.* 1423. *Willd. n. 1.* *Ait. n. 1.* (*P. scandens, hederæ foliis ferratis, fructu tetragono; Plum. Gen.* 47. t. 13. f. 2. *IC.* 220. t. 226.)—Angles of the capsule compressed, keeled.—Native of the West Indies. Miller appears to have cultivated it at Chelsea, in 1739, but it had long been lost, till the late Hon. Mrs. Barrington received a living plant from Jamaica, which blossomed in her stove at Mungewell, near Wallingford, in 1795. The stem is twining, branched, round, leafy, smooth; the young branches alternate, axillary, downy in their upper part. *Leaves* alternate, stalked, simple, heart-shaped, pointed, about three inches long and half as wide, minutely serrated, deep green, rather roughish to the touch, naked, except a slight downiness on the ribs at the back, reticulated on both sides with copious veins, and furnished with a pair of glands at the base. *Footstalks* about one-third the length of the leaves, channelled above, downy near the extremity. *Stipulas* in pairs at the base of the footstalk, very minute, triangular, acute, smooth. *Flower-stalks* axillary, solitary, racemose, downy, square at the base, round above, generally bearing one female flower at the base; conspicuous for its quadrangular germen, thick style, above an inch long, and large globose stigmas; and above it a long compound downy cluster, of numerous small male flowers. Some branches terminate in a cluster of, partly axillary, female flowers only. All the flowers are green, and more singular than beautiful. The bractæas, scattered through the clusters, are small, ovate, acute, smooth, membranous. *Fruit* the size of a small walnut, green, depressed, with four spreading, dilated, compressed, rounded angles, the valves separating elastically at the base. *Seeds* pale brown, large, greatly compressed, lenticular, somewhat bordered, rugged with elevated veins.

2. *P. verrucosa*. Warty Plukenetia. *Sm. in Act. Upf. n. 2.* *Willd. n. 2.* (*P. volubilis; Linn. Suppl.* 421. *Am. Acad.* v. 8. 264.)—Angles of the capsule terminated by two tubercles.—Native of Surinam, from whence our specimens were sent to Linnæus, who inadvertently referred them

them to the above original species. The *leaves* indeed scarcely differ, except in being very minutely and distantly toothed, rather than ferrated. The *flowers* are somewhat smaller. The *capsules* differ most essentially, in being but one-fourth as large as the former, their lobes each tipped with a pair of warts, and not dilated nor keeled. The *seeds* moreover are obovate, not lenticular nor compressed.

3. *P. corniculata*. Horned Plukenetia. Sm. in Act. Upf. n. 3. Willd. n. 3. (*Sajor volubilis*, fructibus corniculatis; Rumph. Amboin. v. 1. 193. t. 79. f. 2.)—Angles of the capsule compressed, tapering, pointed.—Rumphius describes this as found wild in the woods of the district of Baguala, in Amboina, where it is known by the name of *Uta Pela*, or *Uta Tela*. The Dutch were accustomed to cultivate it, for the sake of its leaves; which, when boiled with the milk of the cocoa-nut, prove an agreeable and delicate vegetable. Their name for the plant was *Sajor-Maccou*. The *stems* are long and slender, twining about the trunks of trees, and sending off short lateral alternate *branches*. *Leaves* much like both the foregoing, but according to the plate and description, very evidently and distinctly ferrated. Their scent is strong like elder, but their taste sweet; at least when boiled, for the natural affinities of the genus lead us to presume that none of its species can be eaten without such preparation. *Flowers* small and green. There seem to be sometimes two female ones, with a simple cluster of numerous males above them. The *fruit* is very well described by Rumphius, as resembling the starry anise, *Illicium*, except in having but four cells, sometimes only three, instead of six. "Each segment," says he, "is the size of the seed of *Ricinus*, with a very thin point, and these fruits, when ripe, fly asunder, like the *Ricinus*, with an explosion, throwing out their round, compressed, or lenticular sharp-edged *seeds*." Nothing can more precisely answer to the character of *Plukenetia*, and Linneus actually confounded the plant in question with his *P. volubilis*.

PLUM ISLAND, in *Geography*, an island on the coast of Massachusetts, about nine miles long, and half a mile broad, extending from the entrance of Ipswich river S., nearly a N. course to the mouth of Merrimack river, and separated from the main land by a narrow sound called Plum island river, which is fordable in many places at low water. It consists for the most part of sand blown into ludicrous heaps, and covered with bushes bearing the beach plum. On the N. end stand the light houses, and the remains of a wooden fort, built during the war for the defence of the harbour. On the sea-shore of this island, and on Salisbury beach, the Merrimack Humane Society has erected several small houses, furnished with fuel and other conveniences, for the relief of mariners who may be shipwrecked on this coast. The N. end lies in N. lat. 43° 4', and W. long. 7° 47'.

PLUM-Tree, in *Botany*, &c. See PRUNUS.

PLUM, American black cocoa. See CHRYSOBALANUS.

PLUM Bay. See GUAYAIA.

PLUM, Jamaica, or Hog. See SPONDIAS.

PLUM, Indian date, pishamin, persimon, or pitchumon. See DIOSEYROS.

PLUM, Maiden. See CAMOCLADIA.

PLUMAGE, the feathers, or covering of birds; for the mechanism of which, see FEATHER.

PLUMAGE, in *Falconry*, is particularly understood of the feathers under a hawk's wing.

The falconers also give their hawks parcels of small feathers to make them cast: and these they call plumage.

PLUMARTIN, in *Geography*. See PLEUMARTIN.

PLUMAU, a town of Austria; seven miles N.W. of Hooren.

PLUMB, or PLUM, in matters of spicery. See CURRANTS and RAISINS.

PLUMB Island, in *Geography*, an island on the N.E. coast of Long island, in the state of New York, annexed to Southhold in Suffield county. It contains about 800 acres, and supports seven families. It is fertile, and produces wheat, corn, butter, cheese, and wool. This island, with the sandy point of Gardener's island, forms the entrance of Gardener's bay.

PLUMB Point, Great, lies on the S. coast of the island of Jamaica, and forms the S.E. limit of the peninsula of Port Royal, which shelters the harbour of Kingston. Little Plumb Point lies westward of the former, towards the town of Port Royal, on the S. side of the peninsula.

PLUMB-Line, a term among artificers for a perpendicular line.

It is thus called, because usually described by means of a plumbet.

PLUMBAGINES, in *Botany*, the fourth natural order of Jussieu's 7th class, immediately following his NYCTAGINES; see that article. The name is taken from one of the genera, and the characters are these.

*Calyx* tubular. *Corolla* of one or more petals, below the germen. *Stamens* definite, inserted either below the germen, or into the corolla. *Germen* one, superior; style one or many; stigma many. *Capsule* single-seeded, with many valves at the base, hood-like. *Seed* straight, inserted by a thread-like stalk into the receptacle of the germen. *Coraculum* oblong, flat, surrounded by a farinaceous albumen. *Stem* herbaceous, or somewhat shrubby. *Leaves* alternate.

The genera in Jussieu are only two, *Plumbago* and *Statice*. Mr. Brown adds *Taxanthema* and *Aegialitis*.

PLUMBAGO, a name evidently derived from *plumbum*, lead, but whether it alludes to any colouring quality in the plant, or to the hue of its foliage, critics are not agreed. The latter seems consistent with *P. europaea*, or Common Leadwort, whose leaves are of a very peculiar greyish-green. The *Polygonum Persicaria*, with dark spots on its leaves, has sometimes borne this name, for a similar reason.—Linn. Gen. 86. Schreb. 114. Willd. Sp. Pl. v. 1. 837. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 1. 323. Brown Prodr. Nov. Holl. v. 1. 425. Sm. Prodr. Fl. Græc. Sibth. v. 1. 131. Juss. 92. Tourn. t. 58. Lamarck Illustr. t. 105. Gærtn. t. 50.—Class and order, *Pentandria Monogynia*. Nat. Ord. undetermined by Linneus. *Plumbagines*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, ovate-oblong, tubular, with five plaits or angles, and five teeth, rough, permanent. *Cor.* of one petal, funnel-shaped; tube cylindrical, contracted upwards, longer than the calyx; limb in five ovate, rather spreading, segments. *Stam.* Filaments five, awl-shaped, unconnected with the corolla, enclosed within its tube; anthers small, oblong, versatile. *Pist.* Germen superior, ovate, very small; style simple, the length of the tube; stigmas five, slender, simple. *Peric.* Capsule ovate, thin, of one cell and five incomplete valves. *Seed* solitary, ovate.

Obs. We find no traces of the nectary, or valves supporting the stamens, described by Linneus.

Ess. Ch. Corolla funnel-shaped. Stamens inserted into the receptacle. Stigmas five. Capsule membranous, of one cell. Seed solitary.

1. *P. europaea*. Common Lead-wort. Linn. Sp. Pl. 215. Sm. Fl. Græc. Sibth. t. 191, unpubl. (P. Plini; Ger. Em. 1254. Tripolium Dioscoridis; Column. Ecphr.

160. t. 161.)—Leaves clasping the stem, lanceolate-oblong, rough. Stem straight, erect.—Native of the fourth of Europe. Perennial and hardy in our gardens, but not in general cultivation. The stem is herbaceous, three feet high, upright, leafy, furrowed, with many straight upright flowering branches, each terminating in a simple dense spike, of small pale-purple flowers with a brittle calyx. The leaves are alternate, numerous, recurved, oblong-lanceolate, obtuse, bluntly toothed, dull green, rough but not hairy; their base tapering, then dilated round the stem or branch.

2. *P. lapathifolia*. Dock-leaved Lead-wort. Willd. n. 2. (*P. orientalis*, *lapathi folio*, flore minore albido; Tourn. Cor. 7.)—"Leaves clasping the stem, lanceolate, smooth. Stem divaricated."—Native of Iberia. Stem taller, with longer more spreading branches; leaves much larger, smooth; flowers about half the size of the foregoing. Willd.

3. *P. capensis*. Cape Lead-wort. Thunb. Prodr. 33. Willd. n. 3.—"Leaves stalked, oblong, nearly entire; glaucous beneath. Stem erect." Thunb.—Native of the Cape of Good Hope.

4. *P. zeylanica*. Ceylon Lead-wort. Linn. Sp. Pl. 215. Willd. n. 4. Ait. n. 2. Brown n. 1. (*Lychnis indica* spicata, *ocymastri foliis*, fructibus lappaceis oblongis, radice urente; Comm. Hort. v. 2. 160. t. 85.)—Leaves stalked, oblong-ovate, smooth, entire. Stem erect, round.—Native of the East Indies, and New Holland. It flowers in the stove from April to September. The stem is rather shrubby. Flowers white; with a long tube.

5. *P. rosea*. Rose-coloured Lead-wort. Linn. Sp. Pl. 215. Willd. n. 5. Ait. n. 3. Curt. Mag. t. 230. (*Radix vesicatoria*; Rumph. Amboin. v. 6. 453. t. 168.)—Leaves stalked, ovate, smooth, somewhat toothed. Joints of the stem tumid.—Native of the East Indies; said to have been introduced by Dr. Fothergill in 1777. It blooms in the stove almost all the year long; and is the most favourite species of its genus, on account of the delicate pale scarlet of its flowers, which form compound clusters at the ends of the branches. The stem is shrubby, four or five feet high, slender, and requiring support. Leaves recurved.

6. *P. scandens*. Climbing Lead-wort. Linn. Sp. Pl. 215. Willd. n. 6. Ait. n. 4. (*Dentellaria lychnioides* sylvatica scandens, flore albo; Sloane Jam. v. 1. 211. t. 133. f. 1.)—Leaves stalked, ovate, smooth. Stem zigzag, climbing. Native of the West Indies. It was brought into the stoves of this country very early, but is not much regarded at present, the flowers being white and not striking in their appearance. Sloane compares them to the common field Campion. The climbing, much more lofty stem, distinguishes it from the two last. Their leaves are variable, and afford no well-marked distinction.

7. *P. auriculata*. Auricled Lead-wort. Lamarck Dict. v. 2. 270. Willd. n. 7.—Leaves stalked, ovate-oblong, with scaly dots beneath. Footstalks auricled at their base, and clasping the stem.—Native of the East Indies. Stem shrubby, slender. Leaves obtuse, smooth above; contracted at their base. Flowers in short terminal spikes, resembling those of *P. rosea* in form, but in the dried specimen they had no appearance of a red colour. Lamarck.

8. *P. triflora*. Dark-flowered Lead-wort. Ait. n. 5.—"Leaves obovate, abrupt, smooth.—Native of the Cape of Good Hope, from whence it was sent to Kew by Mr. Masson, in 1792. This is a greenhouse shrub, flowering in May and June. We have seen no specimens of these two last species.

PLUMBAGO, in Gardening, contains plants of the herbaceous, flowering, perennial kinds, of which the species cultivated are; the European leadwort (*P. europæa*); the

Ceylon leadwort (*P. zeylanica*); the rose-coloured leadwort (*P. rosea*); and the climbing leadwort (*P. scandens*).

*Method of Culture*.—The first sort is increased by parting the roots in the autumn, when the stems decay, and planting them in a dry soil. They should afterwards be kept clean from weeds, and have proper support.

The three other sorts should be raised from seeds, which should be sown in pots in the spring, and plunged in hot-beds. They likewise may sometimes be raised by planting slips and cuttings in pots, and plunging them in the same sorts of hot-beds.

These are all ornamental flowering plants; the first in the pleasure-grounds, and the others in pots among hot-house collections.

PLUMBAGO, in Metallurgy, a metalline recement, separated in the purification of gold or silver with lead, and sticking to the sides of the furnace.

This is otherwise called *molybdæna*; and has the same virtue with litharge. See MOLYBDÆNA.

PLUMBAGO seems to have been used, among the Ancients, for Black LEAD (which see), and employed in making pencils for designing, &c.

The black lead used for this purpose, called "plumbago," and also "carbure of iron," by Werner "graphit," the "fer carbure" of Haüy, is a species of coal, or mineral carbon (see COAL), of a dark iron black colour, passing into steel-grey, and occurs in mass, in kidney-shaped lumps, and disseminated. It has a glistening metallic lustre; its fracture is small, somewhat curved foliated, approaching to scaly, or granular uneven: in the great it is flaty. It occurs generally in granular or scaly distinct concretions; takes a polish by cutting or rubbing; gives a dark lead-grey streak, and is unctuous to the feel, soft, and not very brittle. Spec. grav. 1.98 to 2.26. It does not flame when heated, nor can by itself support combustion. After long exposure to a high heat in a muffle, its carbon is burnt off, and its earthy and metallic part remains behind. If one part of plumbago, and two of very caustic dry alkaline, be heated in a retort with the pneumato-chemical apparatus, the alkaline becomes effervescent, hydrogenous gas is obtained, and the plumbago disappears. This experiment proves, that the small quantity of water contained in the salt is decomposed, and that its oxygen, by combining with the carbon of plumbago, forms the carbonic acid. The sulphuric acid does not act upon plumbago, according to Scheele. Pelletier has observed, that 100 grains of plumbago, and four ounces of oil of vitriol, being digested in the cold for several months, the acid acquired a green colour, and the property of congealing by a very slight degree of cold. The sulphuric acid distilled from plumbago passes to the state of the sulphureous acid; at the same time that carbonic acid is obtained, and an oxyd of iron is left in the retort. The nitric acid has no action upon plumbago, unless it be impure. The muriatic acid dissolves the iron and clay which contaminate native plumbago. Messrs. Berthollet and Scheele availed themselves of this method to purify it. The liquor being decanted after digestion upon the plumbago, the residue is then washed and submitted to distillation to separate the sulphur. The muriatic acid alone has no action upon plumbago, but the oxygenated muriatic acid dissolves it; the result being a true combustion effected by the oxygen of the acid, and the carbon of the plumbago. If ten parts of the nitrate of pot-ash be fused in a crucible, and one part of plumbago be thrown upon it by a little at a time, the salt will deflagrate, and the plumbago will be destroyed. The matter which remains in the crucible consists of very effervescent alkali.

alkali, and a small portion of martial ochre. If plumbago be distilled with muriate of ammonia, the muriate sublimes, coloured by the iron. All these facts prove that plumbago is a peculiar combustible substance, a true charcoal combined with a martial basis. The purer kind of plumbago, according to Scheele and Berthollet, consists of about 90 per cent. of carbon and 10 of iron. An impure kind from Pluffier afforded Vauquelin

23 carbon
2 iron
37 alumine
38 silix
—
100
—

The brilliant charcoal of certain vegetable substances, more especially when formed by distillation in close vessels, possesses all the characters of plumbago: and the charcoal of animal substances, possesses characters still more peculiarly resembling it. When animal substances are distilled by a strong fire, a very fine powder sublimes, which attaches itself to the inner part of the neck of the retort. This substance may be made into excellent black-lead pencils. Carbon may be formed in the earth by the decomposition of wood, together with pyrites; but the origin of plumbago, says M. Chaptal, is principally owing to the ligneous, and truly indecomposable, part of the wood, which resists the destructive action of water in its decomposition of vegetable substances. This mineral is found in primitive and transition rocks in England, Scotland, France, Spain, Germany, America, &c. Besides its use for pencils, the best for this purpose is that from Borrowdale, in Cumberland; it is sometimes used to lubricate machinery instead of oil, and to protect iron from rust. The hearths and plates of chimnies and other utensils, which appear very bright, owe their colour to plumbago. For this purpose Homberg long ago, viz. in 1699, directed 8lbs. of hog's-lard to be melted with a small quantity of water, with the addition of 4 oz. of camphor. When this last is fused, the mixture is taken from the fire; and while it is yet hot, a small quantity of plumbago is added to give it a leaden colour. When this is to be applied, the utensils must be heated to such a degree, that the hand can scarcely bear to touch them. In this state the composition must be rubbed on them, and afterwards wiped when the piece is dry. Those who prepare small shot, use black lead to polish or glaze it, by rolling or agitating them together with a quantity of plumbago. It is likewise used to make razor strops. When kneaded with clay, it makes excellent crucibles. One part of plumbago, three of argillaceous earth, and a small quantity of cow's dung very finely chopped, form an excellent lute for retorts; this lute is very refractory; and the glass will melt with the coverings changing its form. Aikin's Dict. Chaptal's Chem. vol. ii.

Pomet says, that plumbago was the sea-lead, *plumbum marinum*, of the ancients; who, he notes, took black-lead for a production of the sea, not a mineral, as it really is; but this is scarcely credible.

PLUMBAGO, in the *History of the Gems*, a word used by the Roman authors to express a blemish common to their worse kinds, and greatly debasing their value. It was a sort of bluish or blackish deadness in the stone, which mixed itself with the other colour, be that what it would, and rendered it dull and dead. The emerald was of all the gems the most subject to this fault; and in this case, its fine green colour was always rendered cloudy and bluish; and in some lights the stone appeared of a dusky greyish-blue,

with no green at all in it. The Bactrian emeralds, which were in great esteem with the ancients, were often subject to this imperfection; and those of Cyprus, taken out of the copper mines, though subject to many other imperfections, were usually quite free from this.

PLUMBAGO, in *Mineralogy*, a name given by many authors to a sort of fossil, having very much the appearance of a lead-ore, but not such in reality.

It is called also galena, blende, and mock-lead. It is usually of a plated texture, and dark blackish-blue colour, like the lead-ores; but on trial it yields no metal. See GALENA and BLENDE.

PLUMBARIA, in *Ancient Geography*, an island situated on the coast of Spain, near the promontory Dianium, according to Strabo.

PLUMBATÆ, among the *Ancients*, a kind of scourge, the thongs of which were armed with lead.

PLUMBATÆ likewise signified leaden balls, used by soldiers to annoy the enemy with; whence the soldiers were called *martioarbuli*.

PLUMBERY, formed of *plumbum*, lead, the art of casting, preparing, and working lead; and of using it in buildings, &c. See LEAD.

The lead used in plumbery is furnished from the lead-works in large ingots, or blocks, called pigs of lead, ordinarily weighing about a hundred pounds a-piece.

As this metal melts very easily, it is easy to cast figures of it, of any kind, by running it into moulds of brass, clay, plaister, &c. But the chief article in plumbery is the sheets, and pipes of lead. They are these which make the basis of the plumber's work in building; the process of these, therefore, we shall give a description of.

*Method of casting large Sheets of Lead.*—The lead destined for this use is melted in a large cauldron or furnace, usually built with free-stone and earth, fortified on the outside with a massive of shards and plaister. At the bottom of it is a place sunk lower than the rest, in which is disposed an iron pot, or pan, to receive what may remain of the metal after the sheet is run. The furnace is so raised above the area of the floor, as that the iron pot just rests on it.

To use the furnace, they heat it with wood laid within it; that done, they throw in the lead at random with the burning coals, to melt.

Near the furnace is the table or mould, on which the lead is to be cast. This consists of large pieces of wood, well jointed, and bound with bars of iron at the ends. Around it runs a frame, consisting of a ledge or border of wood, two or three inches thick, and one or two high from the table, called the *sharps*. The ordinary width of the tables is from three to four feet; and their length from eighteen to twenty feet.

This table is covered with fine sand, prepared by moistening it with a watering pot, then working it with a stick; and at last, to render it smooth and even, beating it flat with a mallet, and planing it with a slip of brass, or wood.

Over the table is a strike or rake of wood, which bears and plays on the edges of the frame, by means of a notch cut in either end of it; and is so placed, as that between it and the sand is a space proportionable to the intended thickness of the sheet. The use of this strike is to drive the matter, while yet liquid, to the extremity of the mould.

At top of the table is a triangular iron peel or shovel, bearing, before, on the edge of the table itself, and behind, on a tressel somewhat lower than the table. Its use is in conveying the metal into the mould; and the design of its oblique disposition is, that it may by that means be able to retain the metal, and keep it from running off at the fore-side, where

where it has no ledge. Some of these peels are big enough to hold fifteen or sixteen hundred weight of lead, and even more.

Things being thus disposed, with a large iron ladle they take out the melted lead, coals and all, out of the furnace; and with this, mixed as it is, they fill the iron peel. When full, they take out the coals, and clear the lead with another iron spoon, pierced after the manner of a scummer.

This done, they hoist up the lower part of the peel by its handle; upon which the liquid matter running off, and spreading itself on the mould, the plumber conducts and drives it to the extremity of the table, by means of the strike, which the workman passes along the ledges, and thus renders the sheet of an equal thickness.

The sheets thus cast, there remains nothing but to edge them, *i. e.* to planish the edges on both sides, in order to render them smooth and straight.

*Method of casting thin Sheets of Lead.*—The table or mould here used is of a length or breadth at discretion, only ledged on one side. Instead of sand, they cover it with a piece of woollen stuff, nailed down at the two ends, to keep it tight; and over this they lay a very fine linen cloth. The feet of the table are uneven, so that it does not stand horizontal, but moderately inclined.

Great regard is, in this process, had to the lead while melting, that it have the just degree of heat, so as it may run well, yet not burn the linen. This they judge of by a piece of paper; for if the paper take fire in the liquid lead, it is too hot; and if it be not shrunk and scorched a little, it is not hot enough.

Being then in its just degree, they have a strike, but different from that described in the former article; as serving both for peel and strike; both to contain and to conduct the liquid lead. It is, in effect, a wooden case without any bottom, only closed on three sides. It is pretty high behind, but the two sides, like two acute angles, still diminish to the tip, from the place where they are joined to the third or middle piece, where they are of the same height with it; *viz.* seven or eight inches high. The width of the middle makes that of the strike, which again makes that of the sheet to be cast.

The strike is placed at top of the table, which is before covered in that part, with a pasteboard, that serves as a bottom to the case, and prevents the linen from being burnt while the liquid is pouring in. The strike is so disposed on the table, as that the highest part looks to the lower end of the table, and the two sloping sides to the higher end.

The strike is now filled with lead, according to the quantity to be used; which done, two men, one at each side the table, let the strike descend down the table, or else draw it down with a velocity greater or less, as the sheet is to be more or less thick; the thickness of the sheet still depending on the promptitude with which the strike slides down the inclining mould.

The fine smooth sheets of lead, thus made, are sometimes used between the joints of large stones in great buildings, &c.

*For the method of casting pipes, without folding, see PIPE.*

The folder which the plumbers use, is a mixture of two pounds of lead with one of tin. See **SOLDER**.

Plumber's work is commonly estimated by the pound or hundred weight; but the weight may be discovered by the measure of it, in the manner below stated. Sheet lead used in roofing, guttering, &c. is commonly between seven and twelve pounds weight to the square foot; but the following table shews by inspection the particular weight of a square foot for each of several thicknesses.

Thickness.	Pounds to a Square Foot.	Thickness.	Pounds to a Square Foot.
.10	5.899	.15	8.848
.11	6.489	.16	9.438
$\frac{1}{8}$	6.554	$\frac{1}{8}$	9.831
.12	7.078	.17	10.028
$\frac{1}{4}$	7.373	.18	10.618
.13	7.668	.19	11.207
.14	8.258	.2 = $\frac{1}{5}$	11.797
$\frac{1}{2}$	8.427	.21	12.387

In this table the thickness is set down in tenths and hundredths, &c. of an inch; and the annexed corresponding numbers are the weights in avoirdupois pounds, and thousandth parts of a pound. So the weight of a square foot of  $\frac{1}{10}$  or  $\frac{10}{100}$  of an inch thick, is 5 pounds and 899 thousandth parts of a pound; and the weight of a square foot to  $\frac{1}{5}$  of an inch thickness is 6 pounds and  $\frac{2554}{1000}$  of a pound. Leaden pipe of an inch bore is commonly 13 or 14 pounds to the yard in length.

*Examples.*

1. How much weighs the lead which is 39 feet 6 inches long, and 3 feet 3 inches broad, at  $8\frac{1}{2}$  lbs. to the square foot?

	Duodecimals.
	39 6
	3 3
39.5	118 6
$3\frac{1}{4}$	9 10 6
118.5	128 4 6
9.875	8 $\frac{1}{2}$
128.375	1024
$8\frac{1}{2}$	64
1027.000	2 $\frac{5}{8}$
64.1875	0 $\frac{3}{4}$
1091.1875	Answer 1091 $\frac{3}{4}$ lbs.

2. What cost the covering and guttering of a roof with lead, at 18s. the cwt.; the length of the roof being 43 feet, and the breadth or girth over it 32 feet, the guttering 57 feet long, and two feet wide; the former 9.831 lbs., and the latter, 7.373 lbs. to the square foot? *Ans.* 115l. 9s. 1 $\frac{1}{2}$ d. *Hutton's Mensuration.*

**PLUMBING**, among *Miners*, a term used to express the using a mine dial, in order to know the exact place of the work where to sink down an air shaft, or to bring an adit to the work, or to know which way the load inclines when any flexure happens in it.

It is performed in this manner: a skilful person with an assistant, and with pen, ink, and paper, and a long line and a sun-dial, after his guess of the place above ground, descends into the adit or work, and there fastens one end of the line to some fixed thing in it; then the incited needle is let to rest, and the exact point where it rests is marked with a pen: he then goes on farther in the line still fastened, and at the next flexure of the adit he makes a mark on the line by a knot or otherwise; and then letting down the dial again, he there likewise notes down that point at which the needle stands in this second position. In this manner he proceeds from turning to turning, marking down the points,

and marking the line till he comes to the intended place ; this done, he ascends, and begins to work on the surface of the earth what he did in the adit, bringing the first knot in the line to such a place where the mark of the place of the needle will again answer its pointing, and continues this till he comes to the desired place above ground, which is certain to be perpendicularly over the part of the mine into which the air-shaft is to be sunk.

**PLUMBUM.** See **LEAD.**

**PLUMBUM Corneum**, called also *Saturnus corneus*, in *Chemistry*, is a metallic salt, formed by the precipitation of lead from its solution in nitrous acid with the marine acid, and all the neutral salts which contain it. It is thus called from its resemblance to the luna cornea. This salt may be made by other methods, and particularly by disengaging the volatile alkali from sal ammoniac by lead. In this way Mr. Margraaf makes the plumbum corneum, which he employs in the preparation of phosphorus. See **LEAD.**

**PLUMBUM Uffum.** See *Burnt LEAD.*

**PLUME**, a set or bunch of ostrich feathers, pulled out of the tail and wings, and made up to serve for ornament in funerals, &c.

**PLUME**, formed of *pluma*, feather, in *Falconry*, is the general colour or mixture of the feathers of a hawk, which shews her constitution.

When a hawk seizes her prey, and dismembers it of its feathers, she is said to plume it.

**PLUME**, in *Botany*. See **PLUMULA.**

**PLUME, La**, in *Geography*, a town of France, in the department of the Lot and Garonne, and chief place of a canton, in the district of Agen ; 7 miles S.S.W. of Agen. The place contains 1588, and the canton 6633 inhabitants, on a territory of  $127\frac{1}{2}$  kilometres, in 10 communes.

**PLUME Ahm.** See **ALUM.**

**PLUMENAU**, or **PLUMLAW**, in *Geography*, a town of Moravia, in the circle of Olmutz ; 4 miles W. of Prosnitz.

**PLUMENTAAL**, a town of Austria ; 4 miles W. of Zisterdorf.

**PLUMERIA**, in *Botany*, was so named by Tournefort, in honour of its discoverer, the celebrated Father Plumier. (See **PLUMIER**, CHARLES.)—Tourn. Inst. 659. t. 439. Linn. Gen. 117. Schreb. 164. Willd. Sp. Pl. v. 1. 1242. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 2. 70. Juss. 145. Lamarek Illustr. t. 173.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Contortæ*, Linn. *Apocineæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, small, in five deep obtuse segments. *Cor.* of one petal, funnel-shaped ; tube long, gradually dilated upwards, naked at the mouth ; limb spreading, in five deep, ovate-oblong, oblique segments. *Stam.* Filaments five, awl-shaped, from the middle of the tube ; anthers converging. *Pistl.* Germen superior, oblong, cloven ; styles scarcely any ; stigma double, pointed. *Peric.* Follicles two, long, pointed, tumid, bent downwards, drooping, each of one cell, and one valve. *Seeds* numerous, oblong, imbricated, winged with a membrane. *Receptacle* separate, cylindrical.

Ess. Ch. Corolla contorted, funnel-shaped : naked at the mouth. Follicles two, reflexed. Seeds with a membranous wing.

1. *P. rubra*. Red Plumeria. Linn. Sp. Pl. 306. Willd. n. 1. Ait. n. 1. Curt. Mag. t. 279. (*P. flore roseo odoratissimo* ; Tourn. Inst. 659. Trew. Ehret. 11. t. 41. Jafminum indicum ; Merian. Inf. Surinam. t. 8.)—Leaves ovate-oblong. Flower-stalks downy, even.—Native of Jamaica and Surinam, where it is cultivated on account of the

beauty and fragrance of its blossoms, which come out before the leaves. Merian says it is readily propagated, and grows rapidly. In our stoves it blossoms in July and August. The stem is thick and fleshy, forming a tall shrub, or small tree, in the course of a few months, and abounding with milky juice. Leaves deciduous, scattered, stalked, a span long, and one and a half or two inches wide, oblong, somewhat ovate or elliptical, pointed; entire, smooth, with one thick rib, and many transverse veins, connected by a submarginal line. We find no traces of the two glands on the footstalks, mentioned by Linnæus, after Browne. The flowers are numerous, in a terminal cymose panicle, whose stalks, in all the specimens we have seen, are densely downy. The corolla expands near two inches, and is rose-coloured, with a yellow mouth.

2. *P. acuminata*. Sharp East Indian Plumeria. Ait. n. 2. (*Flos convolutus* ; Rumph. Amboin. v. 4. 85. t. 38.)—Leaves lanceolate, flat, taper-pointed. Flower-stalks smooth, even.—Native, as well as cultivated, in various parts of the East Indies, being much admired for its beautiful and fragrant white flowers. These, according to Rumphius, are sometimes candied with sugar. It was introduced at Kew, about 1790, by sir Joseph Banks, and flowers there from June to September. The habit of the plant is like the last, but the corolla is white with a yellow mouth ; the flower-stalks smooth ; and the leaves much more pointed. The tapering leaves, and less tumid or rugged flower-stalks, distinguish this from the following, which the flowers most nearly resemble.

3. *P. alba*. White West Indian Plumeria. Linn. Sp. Pl. 306. Willd. n. 2. Ait. n. 3. Jacq. Amer. 36. t. 174. f. 12. (*P. flore niveo, foliis longis angustis et acuminatis* ; Tourn. Inst. 659. Plum. Ic. 227. t. 231.)—Leaves lanceolate, revolute. Flower-stalks smooth, knotty above.—Native of the West Indies, on rocks by the sea side. Jacq. It flowers in our stoves in July and August, but is more rare than the first species. Nothing can exceed the fragrance of the large and elegant white flowers, whose inside, at the mouth of the tube, is yellow, as in the two preceding.

4. *P. obtusa*. Blunt-leaved Plumeria. Linn. Sp. Pl. 307. Willd. n. 3. Ait. n. 4. Aubl. Guian. v. 1. 259. (*P. flore niveo, foliis brevioribus obtusis* ; Tourn. Inst. 659. Plum. Ic. 228. t. 231. Catesb. Carolin. v. 2. t. 93.)—Leaves obovate, obtuse, with a short point. Native of South America and the West Indies. It flowers in the stove in July, according to Mr. Aiton. Our specimen is from Aublet. The shape of the leaves, as above defined, is very different from any of the foregoing, with much more distant, less parallel, veins ; in which respect Plumier's plate is altogether unlike our plant. Our flower-stalks too are much more elongated, zig-zag, and copiously jointed. Aublet says it is as large as a pear-tree of the largest size. Burmann has very improperly confounded the synonyms of *P. rubra* with this, and Willdenow, like Linnæus, erroneously cites under it Rumphius's *Flos convolutus* ; see n. 2.

5. *P. pudica*. Virgin Plumeria. Jacq. Amer. 37. Willd. n. 4.—Leaves oblong, flat. Limb of the corolla closed.—Jacquin says he saw this plant cultivated in the gardens of Curaçao, where it was highly esteemed for its flowers, known there by the name of Douzellas, or virgins, because they are never expanded. Their colour is entirely yellow, and their scent, in the opinion of the author we quote, greatly excels every other *Plumeria*, and seemed superior to all the flowers with which he was acquainted. The shrub is five feet high, milky, with umbrageous, oblong, flat veiny leaves. Flowers lasting, in abundant succession, for two months,

months, their *corolla* always rolled up, like the *Achænia Malvavifcus*.

6. *P. cuneata*. Wedge-leaved Plumeria. Linn. fil. MSS. (*P. alba*; Aubl. Guian. v. 1. 259, excluding the synonyms.)—Leaves obovate, somewhat wedge-shaped, rounded, pointless; veins distant.—Cultivated at Cayenne, according to Aublet, who took it for the Linnæan *P. alba*. We have numerous *leaves* from his own herbarium, given by sir J. Banks to the younger Linnæus, who justly remarked that this must constitute a distinct species, though he had seen merely these separate *leaves*. Another specimen, apparently from the same herbarium, and likewise without *flowers*, is marked *P. laurifolia*; but it looks to us like a less blunt variety of Aublet's *obtusæ*.

The French name of this genus, *Frangipanier*, is rather remarkable. It is said to allude to its fragrance, *Frangipani* being a sort of perfume, so called in France from its inventor, an Italian, of the Frangipani family, so conspicuous in the Roman disturbances of the twelfth century.

PLUMERIA, in *Gardening*, contains plants of the succulent, flowering, exotic kind for the stove, of which the species cultivated are the red plumeria, or jasmine (*P. rubra*); the white plumeria (*P. alba*); the blunt-leaved plumeria (*P. obtusa*); and the close-flowered plumeria (*P. pudica*.)

*Method of Culture*—These plants are capable of being increased by seeds and cuttings of the young branches. The seeds should be procured from the native situation of the plants, and be sown in pots, filled with a light sandy compost, plunging them in a hot-bed, covered by glasses, or the bark-bed in the stove, when they readily vegetate; and when the plants have attained a few inches in growth, they should be removed into separate pots, of a small size, which must be plunged in beds of the same kind as above.

The cuttings should be made from the young branches, and after being laid in the stove or some other dry situation, to dispel their succulence, and heal over the wounds, be planted out during the summer months, in pots, filled with light dry mould, plunging them in the bark bed of the stove, giving occasional shade and very slight waterings, till they have stricken fresh root, and when they have become well rooted, they may be removed into separate pots, being managed as other stove exotics.

They afford much ornament and variety among collections of stove plants; especially the red sort; and when set out with other potted plants in the summer, have a delightful fragrance.

PLUMIER, CHARLES, in *Biography*, a French botanist and ecclesiastic, of the most respectable character, was born in 1646. He belonged to the religious order of Minims, and is described as of a simplicity of character becoming his monastic profession, if not invariably associated with it. To this he added the most enthusiastic love of botany, and a degree of accuracy and penetration rarely excelled in that science. He was sent, at the expence of the French king, on three different voyages to the West Indies; and was about to undertake a fourth, when he died of a pleurisy at Cadix in 1704, aged 58.

His first publication is entitled *Description des Plantes de l'Amérique, avec leurs figures*, a splendid folio of above 100 pages, with 108 plates, which issued from the Louvre press, at the king's expence, in 1693. The text is French; the plates are outlines, drawn by Plumier himself, with a masterly hand. In the preface he relates, that he first imbibed a taste for botany at his convent of Trinità dei monti at Rome, from the lectures of Father Sergeant, a French monk, and of de Onuphrius, a Roman physician. By this taste he was insensibly diverted from the mathematics, which

have always been much studied in that convent, even to our own times. Being ordered to his native country, he obtained the permission of his superiors to botanize on the shores of Provence, and the mountains of the Alps. Here he meditated a general *Pinax*, or System of Botany, with figures, of which he had actually drawn a considerable number, when he found at Marseilles an opportunity of failing to America. Begon, intendant of the French navy, furthered his views, and procured for him the patronage and support of government; by which action alone, if by nothing else, the intendant may be said to have merited his own botanical honours. (See BEGONIA.) Of the plates of this book, 50 are devoted to the fern tribe, and contain many curious species, previously unknown to botanists. The rest of the engravings consist of many species of *Piper*, *Arum*, and *Passiflora*, with other climbing plants. Their parts of fructification are not critically detailed; but that defect was supplied in the author's *Nova Plantarum Americanarum Genera*, a thin quarto, published in 1703, after his third voyage. In this book 106 new genera are established, and illustrated with plates. The manner and principles of Tournefort are adopted throughout. In his nomenclature, Plumier is profuse in honouring botanists, as well as in adopting the most uncouth words of barbarous origin; scarcely constructing one original name, of Greek or Latin derivation, except perhaps *Saururus*, a genus now sunk in the more ancient *Piper*. Haller justly complains, that Plumier falls into the imperfections of Tournefort, with respect to his superficial mode of considering the parts of the flower, and his inattention to number in their description. He hints also that some of the delineations have a doubtful or suspicious aspect. That some of these figures are erroneous in parts, cannot be denied; as the stamens of *Fuchsia*, the stigmas of *Plukenetia*, and the whole flower of *Matthiola*; besides abundance of slight negligences or inaccuracies; but we must not try the performances of one of the fathers of scientific botany, by the test of our present advanced knowledge.

The Ferns of Plumier's first publication were reprinted with a great number of additional figures of the same tribe, very finely executed, in another splendid folio, containing 172 plates, with Latin as well as French descriptions. In the preface he investigates all that had been said relative to the flowers of these plants; and though he attributes to Tournefort a sentiment of Pliny's, he proves himself sufficiently conversant with botanical writers. To give the more consequence to his favourite pursuit, he very commendably enlarges on the benefits which medicine may derive from the study of the vegetable world; but as Rousseau's Swiss herbalist died of a pleurisy, whilst employed in gathering a sovereign Alpine remedy for that disorder; so it is not improbable that Plumier was extolling the *Polytrichum*, see his preface p. 2, as "un antipleuritique des plus affurez," when he himself fell a victim to the very same disorder; leaving his half-printed book to be his monument. So much easier is it for an ardent botanist to catch a pleurisy, we write from the conviction of experience, than to cure one!

The above works contained but a small part of the productions of Plumier's pencil. Vast treasures of his drawings, in outline, have remained in the French libraries, for the most part unpublished. The late earl of Bute obtained copies of a great number of these, which after his lordship's death passed into the hands of sir Joseph Banks. Boerhaave had previously procured copies of above 500, done by the accurate Aubriet, under Vaillant's inspection, which were afterwards, in great part at least, published by John Burmann

mann at Amsterdam, between the years 1755 and 1760. These plates are executed with tolerable, but by no means infallible, accuracy, being far inferior in neatness and correctness to what Plumier himself published. The well-meaning editor has overloaded the book with descriptions of his own, necessarily made from the figures, and therefore entirely superfluous. They are indeed not unfrequently founded in misapprehension; nor has he been very happy in the adaptation of his materials to Linnæan names and principles. He ought rather, as Lamarck observes, to have given Plumier's materials without alteration or addition. A careful reader may, nevertheless, avoid being misled; as the original names and definitions of the author are subjoined. It is a pity that nothing is preserved of the native country, history, properties or colours of each plant.

Father Plumier wrote, in the *Journal des Sçavans* for 1694, and elsewhere, on Cochineal, and some subjects connected therewith; proving that valuable article of commerce to be an animal, and not any thing of a vegetable nature. His opinion was, in every essential point, confirmed, as well as more precisely illustrated and established, by Richter, in his rare little treatise *de Cochinnilla*, published at Leipzig in 1701.

Our author left no herbarium of his own, his collection of dried plants having been lost at sea; but he had, on various occasions, communicated dried specimens to Tournefort; and these still remain, with his hand-writing annexed, in the collections at Paris. Liller, who visited Plumier in his cell at the convent of Minims in that city, speaks of his obliging and communicative manners, and of his "designs and paintings of plants, birds, fishes, and insects of the West Indies, all done by himself very accurately." It appears that, notwithstanding the royal favour, he was obliged to solicit repeatedly, and mostly in vain, for the publication of his drawings at the king's printing-press; so imperfect is government patronage for science on all occasions, and in all countries! See Liller's *Journey to Paris*. Plumier's Works. Haller *Bibl. Bot.*

**PLUMMER'S ETUIOPS.** This medicine is composed of the sulphur auratum antimonii and calomel, commonly in equal parts, *i. gr.* of each three drams; but this may be varied occasionally, according to the physician's discretion. These two powders must be well levigated together, by which the bright red colour of the sulphur is changed into a dusky brown; afterwards, add two drams of the extract of liquorice; and the mass, with a sufficient quantity of the mucilage of gum arabic, may be made into pills. We refer to the *Medical Essays* of Edinburgh for the dose, regimen to be observed, and effects of this medicine; as also for the manner of preparing the sulphur of antimony according to Angelus Sala, which is said to be preferable to the common method. See *Med. Ess. Edinb. abridg.* vol. i. p. 205. vol. ii. p. 455.

This medicine has been found greatly beneficial in cutaneous eruptions, and is said to have completed a cure after salivation has failed, in venereal infections, and in gleet remaining after the cure of a gonorrhœa. It operates by carrying off the excrements of distempers by insensible perspiration or sweat. It has also been found successful in obstinate glandular swellings; two or three pills of an ordinary size may be taken night and morning, the patient keeping moderately warm, and drinking after each dose a draught of the decoction of the woods, or of farsaparilla.

**PLUMMET**, *Plumb-rule*, or *Plumb-line*, an instrument used by masons, carpenters, &c. to draw perpendiculars; in order to judge whether walls, &c. be upright, planes horizontal, and the like.

It is thus called from a piece of lead, *plumbum*, fastened to the end of a thread or chord, which usually constitutes this instrument.

Sometimes the string descends along a ruler of wood or metal raised perpendicularly on another; in which case it becomes a level.

At sea a plummet is used by the pilot to sound the depth of the water.

**PLUMOSE ANTENNÆ**, in *Natural History*, a term used to express the antennæ, or horns of certain moths and butterflies, which are formed in the manner of feathers, being composed of a stem and fibres issuing on each side from it: these are jointed and moveable any way; and even the small fibres, at their sides, are jointed at their bottom, and are moveable, but they move all together. See **FELLERS**.

**PLUMSTEAD**, in *Geography*, a post-town of Pennsylvania, situated on the west side of Delaware river; 36 miles N. of Philadelphia.

**PLUMULA**, in *Botany* and *Vegetable Physiology*, so called from its resemblance to a little feather, is the expanding embryo of a seed just sprouting, which soon becomes a tuft of young leaves, elevated by the protruding stem. See **EMBRYO** and **COTYLEDONES**.

**PLUNDER**, in *Sea Language*, a name given to the effects of the officers or crew of a prize, which are pillaged by the captors.

**PLUNGE**, in the *Mange*. See **ESTRAFADE**.

**PLUNGER**, in *Mechanics*, a solid brass cylinder used as a force in forcing pumps.

**PLUNGER** is also a large vessel, intended to act as a counter-poise for raising the water in a lock, in some of the schemes for saving water. See **CANAL**.

**PLUNOS**, in *Ancient Geography*, a port of Lybia, at the extremity of the country of the Adymachides; mentioned by Lycophron and Herodotus.

**PLUQUET**, FRANCIS ANDREW, in *Biography*, a French abbé of some celebrity in the 18th century, was born at Bayeux, in Normandy, in 1716. He was educated for the church, and obtained some preferment in it: after this, he was nominated to fill the chair of professor of history in the university of Paris. By his lectures he acquired a considerable share of reputation, the claim to which he ably supported by several useful and well-written works. He died in 1790, at the age of 74, having maintained through life the character of a truly virtuous good man. His principal publications are, "An Examination of the Doctrine of Fatalism," in 3 vols. 12mo.; "A Dictionary of Heresies," in 2 vols. 8vo.; "A Treatise on Sociability," in opposition to the system of Hobbes, and to prove that man is disposed to benevolence and religion; "The Classical Books of the Church Empire," in 4 vols. 12mo., translated from the collection of father Noel; and "A philosophical and political Treatise on Luxury," in 2 vols. 12mo.

**PLURAL**, **PLURALIS**, in *Grammar*, a particular inflexion of nouns and verbs, whereby they come to express a plurality or number of things.

The Latins, English, &c. have only two numbers, *singular* and *plural*; the Greeks and Hebrews have three, *singular*, *dual*, and *plural*.

In Latin, &c. both nouns and verbs have usually distinct terminations to their different numbers; in English, nouns substantives usually become plural by the addition of an *s* or *es* to the singular.

Nouns adjective are the same in both numbers; and in verbs, the number is distinguished by that of the pronouns.

**PLURALITY**, **PLURALITAS**, a discrete quantity, consisting of two, or a greater number.

*A plurality*

A *plurality of worlds* is a thing which Mr. Huygens has endeavoured to prove in his *Cosmotheoros*. And the same is likewise contended for in a very pretty treatise of M. Fontenelle under that title.

See the chief argument for a plurality of worlds under MOON, PLANET, and EARTH.

The greatest absurdity in the pagan theology is the *plurality of gods*.

PLURALITY of *Benefices*, or *Living*s, is where the same clerk is possessed of two or more spiritual preferments, with cure of souls. See BENEFICE.

Plurality of benefices is a thing too much tolerated in the church, but never approved of.

It was the smallness of some benefices that first gave occasion to pluralities; for an ecclesiastic, not being able to subsist on a single one, was allowed to hold two; and at length the number increased without bounds.

The abuse was endeavoured to be remedied at the council of Lateran, under Alexander III. and Innocent III., in the year 1215, when the holding more than one benefice was expressly forbid by a canon, under the penalty of deprivation: but the same canon granting the pope a power to dispense with it in favour of persons of distinguished merit, there were so many found a title to this merit, that the prohibition became useless.

Pluralities were also restrained by statute 21 Hen. VIII. cap. 13, which enacts, that if any person, having one benefice with cure of souls, of the yearly value of 8*l.* or above, (in the king's books,) accept any other with cure of souls, the first benefice shall be adjudged in law to be void, &c., though the same statute provides for dispensation in certain cases. For other provisions of a later date, see CHAPLAIN and CURATE.

In order to procure a dispensation, the presentee must obtain of the bishop, in whose diocese the livings are, two certificates of the values in the king's books, and the reputed values and distance of such livings; one certificate for the archbishop, and the other for the lord chancellor. And if the livings lie in two dioceses, then two certificates, of the same kind, are to be obtained from each bishop. He must also exhibit to the archbishop his presentation to the second living; and bring with him two papers of testimonials from the neighbouring clergy, concerning his behaviour and conversation, one for the archbishop, and the other for the lord chancellor; and he must also exhibit to the archbishop his letters of orders of deacon and priest, and a certificate of his having taken the degree of master of arts at the least, in one of the universities of this realm, under the hand of the register of such university. And in case he be no doctor or bachelor of divinity, nor doctor of law, nor bachelor of canon law, he is to procure a qualification of a chaplain, which is to be duly registered in the faculty office, in order to be tendered to the archbishop, according to the statute. And if he hath taken any of the aforesaid degrees, which the statute allows as qualifications, he is to procure a certificate thereof as already mentioned, and to exhibit the same to the archbishop; after which his dispensation is made out at the faculty office, where he gives security according to the direction of the canon. Afterwards he must repair to the lord chancellor, for confirmation under the broad seal; and then he is to apply to the bishop of the diocese where the living lies, for his admission and institution. By 48 Geo. III. c. 149, for every skin, or paper, or parchment, &c. on which any dispensation to hold two ecclesiastical dignities or benefices, or a dignity and a benefice, shall be engrossed or written, there shall be paid a stamp duty of 3*0l.*, when either of them shall be

above the yearly value of 10*l.* in the king's books; and in all other cases 20*l.*

We have also a regulation in regard to pluralities; but it is often dispensed with; for, by the faculty of dispensation, a pluralist is required, in that benefice from which he shall happen to be most absent, to preach thirteen sermons every year, and to exercise hospitality for two months yearly.

In Germany the pope grants dispensations for possessing a plurality of benefices, on pretence that the ecclesiastical princes there need large revenues to bear up against the Protestant princes.

PLURIES, in *Law*, a writ that issues in the third place after two former writs have been disobeyed: for first goes out the original writ or *capias*, which, if it has no effect, then issues the *alias*; and if that also fails, then the *pluries*. Old. Nat. Br. 33.

It is used in proceedings to outlawry, and in great diversity of cases. Tabl. Reg. Writs.

PLURS, in *Geography*. See PLEURS.

PLUS, in *Algebra*, a term commonly used for *majus*, of *magis*, *more*; denoted by the character +.

Thus  $4 + 10 = 14$ , is read, four, *plus*, or more, 10, is equal to 14.

PLUSH, in *Commerce*, &c., a kind of stuff having a sort of velvet nap or flage on one side; composed regularly of a woof of a single woollen thread, and a double warp, the one wool, of two threads twisted, the other goats' or camels' hair; though there are also some plushes entirely worsted, and others composed wholly of hair.

Plush is manufactured, like velvet, on a loom with three treadles. Two of these separate and depress the woollen-warp, and the third raises the hair-warp, upon which the workman throwing the shuttle, passes the woof between the woollen and hair-warp; and afterwards laying a brass broach, or needle, under that of the hair, he cuts it thereon with a knife destined for that use, conducting the knife on the broach, which is made a little hollow, all its length; and thus gives the surface of the plush an appearance of velvet.

Some ascribe the invention of plush to the English; others say it was first made in Holland, and particularly at Haerlem. Be this as it will, it is certain the French are the people who make the most of it; there being several very considerable plush manufactures at Amiens, Abbeville, and Compeigne.

There are other kinds of plush, all of silk; some of which have a pretty long knap on one side, and some on both.

PLUSH, among *Botanists*, is a name given to the middle of roses, anemones, &c., called also *thrum* or *thrummy heads*; by others, *hairy heads*, *buttons*, *bafs*, *tuft*, or *wort*.

This is properly the *stamina* of the flower.

PLUTARCH, in *Biography*, an eminent biographer, was born at Chæronea in Bœotia, of a family that had long filled the offices of magistracy in that city. The time of his birth is not exactly ascertained, but it was probably about the commencement of the reign of Nero. He studied under a philosopher of the name of Ammonius, whose particular sect is not known. After he had completed the usual course of academical education, he travelled for improvement; and it is said that he visited Egypt: there is, however, no other evidence of this fact than that he wrote a treatise on Isis and Osiris. His attachment to study did not prevent him from engaging in public business. While he was a very young man, he went on a deputation to the Roman proconsul; and it was probably in some public capacity that he first visited Rome, and other parts of Italy;

for he says, he had not leisure at that time to learn the Latin language, on account of the number of commissions with which he was charged, and the numbers who resorted to him in order to be instructed in philosophy. He either revisited Rome, or made it his continued abode for a considerable time, since we find him in reputation there during the reign of Trajan, who is supposed to have been one of his auditors. That same emperor is said to have raised Plutarch to the consular dignity: this, however, was probably only a titular honour. He finally retired to his native place, in which he fixed his residence, giving this as a reason, that being born in a little city, he would not make it less by deserting it. Here he was chosen to the office of archon, or chief magistrate, and was afterwards admitted into the college of priests of the Delphic Apollo. He is thought to have died about the year 120. He was married, and had several children. Two sons survived him, *viz.* Plutarch and Lamprias; the latter probably imitated his father in his studies, as he drew up a catalogue of his works, and is supposed to have collected his apophthegms. He had a nephew, Sextus, who was preceptor in the Greek language to the emperor Marcus Antoninus. The name of Plutarch is popularly known by his "Lives" of illustrious men, one of the most interesting remains of ancient literature, and to which, in our biographical articles, we have had frequent recourse. A vein of pure morality runs through them, with a spirit of piety, occasionally deviating into superstition. From the list of his writings it appears that several of his biographies are lost. Plutarch's moral treatises are numerous and valuable; the author does not excel in depth and sagacity, but his sentiments are commonly marked with good sense and candour. In kindness of heart and humanity few philosophers have surpassed him. It appears from his son's catalogue, that more of his works of the moral and critical class have been lost than preserved. Of the complete works of Plutarch, the best editions are those of Maufac and of Reiske. There are numerous editions of the Lives, and other detached works, translated into various languages. In our own language we have a great number of different editions.

Though no dictionaries or biographical accounts in our country, or in France, seem to have taken notice of his knowledge and love of music, or of his writings on the subject, M. Burette, in the 8th vol. 4to., and 11th abridg. of the Memoirs of the Acad. des Inscriptions et Belles Lettres, in 1726, took up the subject of ancient Greek music, and, with a true critical spirit, laid open all its arcanæ, after a long study of modern music, and the Greek writers who have treated of it *ex professo*, or incidentally; letting us know nearly all that is to be known with certainty of this mysterious subject.

After denying to the ancients, in the most formal terms, the knowledge of counterpoint, he proceeds to the examination of Plutarch's "Dialogue on Music," first removing all doubt of its having been written by him, which had been disputed, and then proceeds to a close, and, in general, faithful translation, which he gives opposite to the original text; and proves from that work itself, that the ancients were perfectly ignorant of composition, or music in parts. And what gives greater force to this proof is, that Plutarch was thoroughly versed in the subject which he treats. He writes of the nature of sound, so far as was then known; of its generation and proportions; of the genera, intervals, modes, rhythm, melopœia; explains the musical technicæ of the Greeks, (not the notation,) but neither quotes nor mentions any practical musician, except Aristoxenus. Of poet musicians, from Homer to the time of Alexander

the Great, he makes honourable mention, but of none after.

He speaks frequently of music having been corrupted by the theatre, particularly in his "Dialogue," where he says, "If we look back into remote antiquity, we shall find that the Greeks were unacquainted with theatrical music. The only use they made of this art was in praising the gods, and educating youth. The idea of a theatre had not then entered their thoughts, and all their music was dedicated to sacrifices, and to other religious ceremonies, in which they sung hymns in honour of the gods, and canticles in praise of great and good men."

It should be remembered here, that Plutarch was a priest of Apollo; and, moreover, that what he, Plato, and Aristoxenus say, concerning the injuries which music had received from the theatre, favours very much of cant and prejudice. Athenæus, on the contrary, tells us, that notwithstanding the complaints of Aristoxenus against theatrical corruption, others were of opinion, that music derived its principal improvements in Greece from the theatre; and it seems natural, that the hope of applause, and the fear of censure, should operate more powerfully on the industry and faculties of a composer or performer, than the idea of private praise or blame. And, if we may judge of ancient times by the present, the theatre seems the place to develop all the powers of music, and to expand the talents of its professors: for it is at the musical theatre, the modern temple of Apollo and the muses, that perfection of various kinds is more frequently found than any where else. But old things do get violently praised, particularly music, after it ceases to give pleasure, or even to be heard; and old people exclusively praise what pleased them in their youth, without making allowance for their own want of judgment and experience at that time, which, perhaps, joined to the disposition of youth to be easily pleased, occasioned their former delight.

It is natural to suppose as Greek music, like other arts, and other things, must have had its infancy, maturity, and decrepitude; that in second childhood, as its effects were more feeble, its pursuits would be more trivial than before its decline. Few great actions were achieved by the Greeks after their total subjection. However, they cultivated music under the Roman emperors, under their own, and are still delighted with it under the Turkish government; but their music is now so far from being the standard of excellence to the rest of the world, that none but themselves are pleased with it.

Plutarch treats the subject of music in a manner less dogmatical than historical. The two principal branches of the art, upon which he lays the most stress, are the harmonical and rhythmical; that is, *tone*, or melody, and *time*.

In M. Burette's notes, he gives a biographical account of all the ancient poets and musicians mentioned in the course of the Dialogue; which saves his readers much trouble in seeking them, dispersed as they are through all literature; and greatly enlivens the translation of many parts of the treatise, that are now either unintelligible or useless.

Upon the whole, however, there is more to be learned from this Dialogue, concerning the history, and indeed practice, of ancient music, thus illustrated and explained, than in Meibomius, Ptolemy, and all the philosophers and mathematicians, who only treat of the monochord, ratios, and harmonics, without giving us a single passage of ancient music, or telling us what it was in practice.

PLUTEI, in the Roman *Art of War*, were engines contrived for the defence of soldiers, consisting of the same materials

materials with the vineæ, but of a different figure; being shaped like an arched sort of waggon, and having three wheels, so conveniently placed, that the machines would move either way with equal ease.

PLUTO, in *Mythology*, the son of Saturn and Rhea, and sovereign of the empire of darkness. Statius calls him the black Jupiter; and he is represented by the poets as seated on a throne, holding his sceptre in his hand, which had two points by way of distinguishing it from Neptune's trident, which had three, with a veil over his head, which, as well as his complexion, should be dark and terrible. He is sometimes called by the name of Dis.

The fable of Pluto's having had hell or the empire of darkness assigned him for his lot is thus explained by Diodorus Siculus. He says, that it arose from his being the first who founded the custom of burying the dead, of transferring them into sepulchres, and of bestowing other services upon them, which before him had been neglected. But Banier, not thinking it probable that duties so natural would have been neglected till the time of Pluto, is of opinion, that he was reckoned the king of hell, because he lived in a very lone country in respect of Greece, where Jupiter had fixed his empire. This country was the extremity of Spain, where he busily employed himself in working at the gold and silver mines, which were very common near Cadiz, where he fixed his residence. Spain was anciently reckoned a country abounding with rich mines; and near Tartesus, at the mouth of the river Betis, it is said there was a mountain of silver: and from this name of the island Tartesus, Tartarus is supposed to have been derived. This circumstance induced Pluto to fix his residence in this island, and hence he obtained the name of Pluto, the god of riches, and has been sometimes confounded with Plutus. Besides, Pluto's kingdom was not only low in respect of situation compared with Greece, but as Pluto employed labourers in the mines, who dug into the bowels of the earth, and penetrated, as it were, to the gloomy mansions of the manes, *adn*, or hell, in search of hidden treasures, he was reckoned king of the dead. Besides, the ocean, on the coast of which he reigned, was accounted a place over-spread with darkness, and this, as Banier imagines, was the foundation of all the fables that were invented concerning Pluto and his realms of darkness. Tartarus he supposes to have been derived from Tartesus near Cadiz, and the river Lethe from Guadelethe, which runs over-against that city, and the lake Avernus from the word Abarona, importing *at the extremities*, a name given to that lake, which is near the ocean; accordingly Pluto was particularly worshipped at Cadiz, under the name of Death, as Philostratus has observed; of which there can be no doubt, since the Phœnicians, whose language was established at Cadiz with the colonies planted there by Hercules, called Pluto *Muth*, their name for Death. We might also add, that all the names given to him, or the countries where he was worshipped, have a relation to this title, "god of the dead." For the rape of Proserpine by Pluto, see PROSERPINE.

PLUTUS, the god of riches, reckoned amongst the number of infernal deities, because riches are derived from the bowels of the earth. Hesiod makes him to be a descendant of the Ceres and Jason in the isle of Crete, probably because these two persons applied themselves to agriculture, which is the means of obtaining the most substantial riches. Plutus had a statue at Athens, placed in the temple of Minerva, where the public treasures were deposited; at Thebes, in the temple of Fortune, this goddess holds Plutus in her arms as an infant, nourished by her;

and at Athens, Plutus is in the arms of the statue of Peace, as the symbol of riches, which give peace.

This Plutus, having been observed to dispense his favours very unequally, was therefore represented as blind: and Aristophanes in his "Plutus" adds, that he was lame, because whenever he had a mind to enrich the good, he came to them very slowly; and when it was his intention to favour them, he was very clear-sighted, and said to have good eyes. Pindar, Aristophanes, and Lucian inform us, that Plutus was a daftardly god, on which circumstance Erasmus has founded one of his proverbs; but Plutus vindicates himself from that imputation, in the comedy above cited, and says, that as thieves and robbers never could catch him, that is, never could acquire great riches, they hence constructed his precaution and foresight to be cowardice. St. Jerom, followed by several ecclesiastical writers, alleges that the Syriac or Chaldaic word "Mammona" was the same with the Plutus of the Greeks.

PLUVIAL, PLUVIALE, anciently signified a hood or cloak; which ecclesiastics, chiefly religious, wore in the country, to shelter themselves from the rain; by the Latins called *pluvialis lacerna*.

The word is now used, in the Romish church, for a large hood worn by the chanter and subdeacon at mass and vespers, &c. It covers the whole man, and is fixed before with two clasps.

PLUVIALIS, in *Ornithology*. See PLOVER.

PLUVIALIS Major, a name given by some authors to the limosa, a bird in some respects resembling our red shank, but larger and longer legged.

This bird is also called the *glottis*. See SCOLOPAX *Glottis*.

PLUVIALIS *Levis*, a name given by many to the common green wood-pecker, the *picus viridis* of authors, called also in English the *rain-fowl*, from an observation of its always being most clamorous when rain is coming on. See PICUS *Viridis*. See also CUCULUS *Pluvialis*.

PLUVIGNER, in *Geography*, a town of France, in the department of the Morbihan, and chief place of a canton, in the district of L'Orient; 14 miles E. of L'Orient. The place contains 4800, and the canton 12,476 inhabitants, on a territory of 252½ kilometres, in seven communes.

PLUVIUS, in *Antiquity*, an attribute of Jupiter; implying him the author of rain; *q. d.* he that sends rain. Among the basso relievos of the Antonine column, in the place where the miracle of the thundering legion is represented, we see a flying man in the air, his arms spread out, and with a very long beard, which seems to dissolve into rain. The learned take this to be a representation of Jupiter Pluvius. The Athenians worshipped him under this name, as we learn from Pausanias in Attic.

PLYERS, in *Fortification*, denote a kind of balance used in raising or letting down a draw-bridge. They consist of two timber levers, about twice the length of the bridge they lift, joined together by other timbers framed in the form of a St. Andrew's cross, which serves as a counterpoise. They are supported by two upright jambs, on which they swing; and the bridge is raised or let down by means of chains joining the ends of the plyers and bridge.

PLYING, or PLYING to *Windward*, in *Seaman'ship*, the act of making, or endeavouring to make, a progress against the direction of the wind. Hence, a ship that advances well in her course in this manner of sailing, is said to ply well, or be a good plying. See BEATING, in *Navigation*.

*Plying* is also used by ferrymen to denote their waiting for a fare.

## PLYMOUTH.

PLYMOUTH, in *Geography*, a town having separate jurisdiction, in the hundred of Roborough, at the western extremity of Devonshire, is 218 miles W.S.W. from London. It is situated at the head of a capacious haven, formed by the conflux of the rivers Tamar and Plym with the sea, and is probably the largest corporate town in the county, as well as one of the most important maritime places in England. Within a circuit of two miles, including its appendages of Stonehouse and Dock, there is a population of between 60,000 and 70,000 people, exclusive of seamen and foldiers. Plymouth is of considerable antiquity, and was called, in the time of the Saxons, Tameorwerth: after the Conquest it acquired the name of South-Town, or Sutton; and in the reign of Edward I. of Sutton-Prior, and Sutton-Valletort, the north part of the town being situated on the lands of the prior of Plympton, and the south part on the estate of the Valletorts. These names were relinquished in the reign of Henry VI., for the more appropriate appellation of Plym-mouth. In the reign of Edward III. the increasing consequence of the town rendered it an object of jealousy to the French, who landed here, and endeavoured to destroy it by fire; but were repulsed, with the loss of 500 men, by Hugh Courtenay, earl of Devonshire, under whose command the surrounding gentry and their vassals had associated with much celerity. In the sixth year of Henry IV. the French were more successful, when they landed near that part now called Briton-side, and burnt upwards of 600 houses; but failing in their attempts against the castle and higher part of the town, they retired to their ships, and proceeded to Dartmouth, where their commander, De Castell, and several hundred men, were made prisoners. From this time till the reign of Henry VI., the town dwindled into a mere fishing village; when it was rebuilt and improved by the prior of Plympton, who, by granting certain privileges, occasioned a considerable increase of inhabitants, and effected the revival of trade and enterprize. In the 18th year of Henry VI. it was incorporated as a borough, and on the dissolution of monasteries, in the reign of Henry VIII., the entire lordship of the borough, together with the patronage of the religious establishments within or near the town, were given to the mayor and commonalty, and these advantages they still retain. In the reign of queen Elizabeth, through the means of sir Francis Drake, various privileges were granted to the town, and at the private expence of the same gallant admiral, a stream of water was conveyed to it from some springs on Dartmoor, by a winding channel of twenty-four miles in length. In the year 1579, Plymouth was visited by a dreadful plague, supposed to have been introduced with some cotton-wool, landed from a Smyrna ship, without first being properly aired. Upwards of 600 persons fell victims to its ravages; and so general was the fear of its spreading, that the annual election for mayor was held in the open air, on Cat-down, some distance from the town. In 1581 the plague again broke out, and continued several months; and many of the inhabitants became victims to its violence. At the period of the expected invasion by the Spanish Armada, in 1588, a British fleet of 120 sail was assembled in Plymouth Sound, under the command of lord Howard, and the admirals sir Francis Drake and sir John Hawkins. This fleet failed for Torbay to join the Exeter ships; and soon afterwards the grand Spanish armada, which papal arrogance had pronounced invincible, appeared in the form of a crescent, and lay to off the harbour of Plymouth; but proceeding to the eastward, it was assailed by the British fleet, and a destruction thus commenced was completed by a violent storm, which utterly

frustrated the expedition. In 1595, the landing of the Spaniards in Cornwall, (for which see PENZANCE,) threw the inhabitants of Plymouth into much alarm, and caused the adoption of various precautions to ensure their safety. From this period till 1625, nothing material occurred, when Charles I. with his whole court, 120 ships, and 6000 troops, came from Portsmouth, and remained here ten days, sumptuously entertained by the mayor and corporation. In the following year, Plymouth was a third time infested by a plague, which raged with incredible fury, till nearly 2000 persons were destroyed. About 1637, in consequence of a petition to that effect from the mayor and commonalty, the town was divided into two parishes, and in 1640, an act was obtained for the erection of a new church; but the civil wars, which soon after ensued, occasioned the suspension of this latter design. At the breaking out of the civil war, Plymouth very early declared in favour of the parliament, and the year 1643 forms a memorable era in the annals of its history, from the spirited resistance made by the inhabitants against the forces of prince Maurice, who besieged it from September till the close of the year without success. What the citizens wanted in means of defence, was made up to them in enthusiasm, and they held out till the parliamentary forces, under the earl of Essex, approached to their relief. On the surrounding eminences are still to be traced the remains of various works, constructed both for the defence and reduction of the town. The different attempts of the royalists, under the king in person, and his general, sir Richard Grenville, successively proved abortive, and they were finally compelled to raise the siege, and entirely withdraw their forces. In the year 1683 the charter of the town was surrendered to the king, on the requisition of judge Jefferies, and a new one granted at an expence of 417*l.* 19*s.* This vested the power in ten aldermen and twelve assistants only, and continued in force till the latter end\* of the year 1697, when the old charter was restored, though not before upwards of 600*l.* had been ineffectually expended.

Various fortifications have been at different times erected for the security of Plymouth, and it is now in a state of respectable and formidable defence. Several smaller block-houses and forts were demolished on the building of the citadel on their site, in the time of Charles II., in 1670. This strong fortress consists of three regular, and two irregular bastions; and the curtains of the regular bastions are further strengthened by two ravelins and horn-works. On the east, north, and west sides is a deep ditch, counter-scarp, and covered way, palisadoed. In the time of war the parapets are mounted with a great number of heavy ordnance, and the garrison consists of a regiment of militia. A lieutenant-governor, and other officers, reside here. The view from the ramparts is exceedingly beautiful, and comprehends a great variety of interesting objects. There is a lower fort, connected with the citadel, and chiefly intended for the defence of the sound. Besides these works, several batteries and block-houses are raised on different points of the harbour; on mount Batten, Staddon-heights, and at Maker; but its chief security is St. Nicholas isle and its formidable batteries. This island rises nearly in the centre of the sound, between the Plymouth shore and mount Edgecumb. Between the latter and the island is a ridge of rocks, great part of which is visible at low water, and renders the entrance into the sound, or harbour, difficult and dangerous.

The Victualling office, under the eastern walls of the citadel, is an extensive range of buildings, where the ovens for

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supplying the navy with bread, and the ingenuity exercised in the baking and preparations, present interesting objects: though there are but two bakehouses, each containing four ovens, yet they are heated eight times a day, and in the course of that time bake a sufficient quantity of bread for 16,000 men. The granaries are large and well constructed; and the whole process of converting the grain into bread is simple and ingenious.

The town itself has very few claims either to elegance or neatness; the streets are in general ill constructed, irregular, and badly paved, but a better taste characterises the improvements which are taking place. Amongst the public buildings the most ancient is the parish church, which consists of a nave, side aisles, and chancels, with a tower at the west end, ornamented with pinnacles. This structure contains several curious and ancient monuments. The precise period of its erection is not known, but it is mentioned in a general survey in the year 1291. The tower is of more recent date, having been built, in 1440, by Thomas Yogge, a merchant of the town. The other church, begun in 1646, is consecrated to the memory of Charles I., and called Charles's church. Sectarists are numerous, and here are various meeting houses, chapels, and a synagogue for Jews. The Guildhall, lately rebuilt on the site of a more ancient one, is a very indifferent edifice. It contains a few portraits of some of the English sovereigns and other illustrious personages. Adjoining the guildhall, and connected with it, are the public prisons of the town; they consist of a room for debtors, and several cells for prisoners, all very small and inconvenient. There are twenty-one charitable institutions in Plymouth, some of them established and supported by the town, others by voluntary contribution, and the rest from the annual income of donations by individuals. Of the former are the workhouse, which is a very useful and well regulated institution; St. Andrew's alms-houses, in which twelve widows are permitted to live gratis, with a small weekly allowance; and the workhouse alms-houses, of a similar nature with the last. Those supported by voluntary contribution are the Public Dispensary, Household of Faith, Female Asylum, Grey and Yellow School, School of Industry, Public School, on the new plan of instruction designed by Dr. Bell and Mr. Lancafter; Misericordia, Lying-in-Charity, and Merchants' Hospital; for maimed and disabled seamen, and the widows and orphans of such as are killed, slain, or drowned in the merchants' service. Those maintained by private bequests are, Hele's charity, Lanyon's charity, Orphan's aid hospital and grammar-school, Charles' alms-houses, Jory's alms-houses, lady Rogers' school, Kelway's trust. The Presbyterians have a very extensive seminary for educating girls in the tenets of their sect, supported by the contributions of their members. Among the other public buildings are to be noticed the public library, a new and elegant edifice erected by the subscribers. It is capacious and convenient, and the architectural part executed with taste and judgment by Mr. Feneston; the front in imitation of a temple at Athens. The theatre and hotel, covering with their appendages nearly an acre of ground, have just been completed by the mayor and commonalty, at an expence of nearly 40,000*l.*; the front is very noble and has a portico, the largest in this country, containing eight columns of the Ionic order forty feet in elevation. The theatre is the handsomest country theatre in England, and is constructed almost entirely of iron. The roof is sixty-four feet span, and was made at Bristol of wrought iron bars. There are three tiers of boxes formed of cast-iron, the fronts thinly cased with wood to preserve the sound. Plans for

a new public exchange have been adopted, and are about to be acted upon, as well as are those for a new parish church. Government has several military establishments here, such as barracks, hospitals, and prisons. The latter have lately been rebuilt, and are capable of containing 3000 men; they are placed under the direction of a captain of the navy, and used as a depot for prisoners of war, from whence they are sent to Dartmoor and other inland prisons.

Plymouth was constituted a borough in the eighteenth year of Henry VI., and has sent two members to parliament, without intermission, since that period. It is governed by its own magistrates; who are a mayor, justice, and the two senior members of the bench of aldermen. In addition to the mayor and justice, the corporation consists of twelve aldermen, twenty-four common-council men, a town clerk, and a coroner. A general sessions of the peace is holden here four times in the year, where all offences, which extend to transportation for seven years, are tried, and those of minor importance are determined by the mayor at his weekly sitting in guildhall. There is a considerable trade carried on at Plymouth independently of the importation of coals, culm, corn, wine, timber, and articles for town consumption, even during war, at which times a vast deal of business arises from the sale of prizes and their cargoes, which attract purchasers from all parts of the kingdom. During peace an active trade is carried on with Newfoundland. A new and convenient pier was erected in 1790, at the expence of government, which secures the vessels lying in the pool, or inner harbour, from the violence of the waves. The market days are Mondays, Thursdays, and Saturdays. The market-place has lately been erected at an expence of 10,000*l.*, and is very extensive and commodious, comprehending three acres of ground, with an open area for a cattle market. The revenues belong to the corporation, and are considerable. Here are held two annual fairs.

The borough of Plymouth and its suburbs, according to the population report of 1811, contains 5732 houses, and 56,060 inhabitants. Of these it is specified that 12,339 were resident within the parish of St. Andrew.

This town has not acquired much literary character. Joseph Glanville, a celebrated divine and philosopher, was born here in 1636. (For an account of his life and writings, see vol. xvi. art. GLANVILLE, JOSEPH.) The brave admiral sir John Hawkins, who commanded the rear of the fleet which defeated the Spanish armada, was a native of this town (see vol. xvii.); and it was long the residence of the celebrated sir Francis Drake, who was a member of the corporation, representative to parliament, and the author of many valuable improvements in Plymouth, and its vicinity. (See vol. xii.) In the east parts of the town are the remains of the priory of White friars, granted in the 38th year of Henry VIII. to Giles Iseham. The principal gateway or entrance is in a very dilapidated state, but the ruins of the priory itself are almost extinct, and their site occupied by a smith's shop. The hospital of the Grey friars is still remaining, and is now a private house. An abbey of Cistercian friars is still standing south of St. Andrew's church, and is denominated the abbey wine vaults, the vaults being occupied for that purpose.

PLYMOUTH *Port and Harbour* is conveniently adapted for the purposes of trade, and affords an excellent road for ships of war, their prizes, and merchant vessels. The harbour is divided into several ramifications, which are distinguished by different appellations. Sutton-pool immediately adjoins the town, the buildings of which nearly encircle it. The entrance to the pool is between two large piers, erected by

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parliamentary grants in 1791—1799. It is furrounded with public and private quays, and all ships entering it are obliged to pay certain dues on landing their cargoes. The pool is under the superintendance of a company, by whose management it has been benefited with important improvements.

Catwater harbour is formed by the estuary of the river Plym, and is capable of protecting from the south-west gales, which are prevalent, upwards of 500 ships. Part of this harbour is under the jurisdiction of the mayor and commonalty of Plymouth, the other part is subject to the controul of the present lord Boringdon, who has been at much expence in laying down moorings, buoys, &c. On the banks of the Catwater are several small villages. Cat-down, on the northern side, is famous for its lime-stone quarries: it has a shipwright's yard, various store-houses, wharfs, &c. for commercial transactions. Turnchapel, on the opposite bank, is the property of the Boringdon family, and is principally inhabited by shipwrights employed at the dock-yard here, where large ships of war are frequently repaired, and merchant and armed vessels constructed. Oreston is a populous village on the eastern banks, principally inhabited by sea-faring men. In this neighbourhood are also the beautiful villages of Upper and Lower Hooe.

Proceeding from Catwater we enter into that part of the harbour denominated the *Sound*, which is a large and capacious bay peculiarly adapted for a naval rendezvous. One disadvantage, however, attends it, of no inconsiderable kind, which is its exposure to southerly and south-westerly winds, that occasion a tremendous swell. To obviate this objection, and render it safe as well as commodious, the lords of the admiralty determined to erect a pier or breakwater, and applied to Mr. Rennie, a gentleman well fitted, from his extensive architectural knowledge, to propose an efficient and practicable remedy, and render them a plan for the purpose. The report of this gentleman has been put in execution, and the work is in a state of great forwardness. The plan of its construction is this: it is a mass of sunken stone, in length 850 fathoms, extending from about 60 fathoms east of St. Carlo's rocks, on the east, to about 300 fathoms west of the Shovel, on the west. Another pier is made from Andurn Point towards the before-mentioned breakwater, about 400 fathoms in length, having an inclined kant, forming an angle of about 120°. Of the first, about 500 fathoms in the middle are straight, and 170 fathoms at each end inclined to the straight parts in an angle of 120°. These inclined ends prevent the inrun of the sea from agitating the water, and shelter a greater extent of the sound. The two kants of the eastern end of the breakwater, and western end of the pier, repel the waves in such a manner as to prevent them from passing in any material degree through the opening between. The improvements are constructed of large blocks of stone, thrown promiscuously into the sound in the line of the breakwater, leaving them to find their own base, which is about seventy yards broad, and the top is intended to be about ten yards in width, at the level of ten feet above the low water of an ordinary spring tide. The principal part of the stone used for the works is brought from quarries at the head of Catwater, in small vessels, of from 50 to 100 tons, with a crane fixed in their decks to take out the stones, and throw them into the water. The expences necessary to complete the undertaking were estimated at 1,150,000*l.*: the quantity of stone required 2,360,000 tons. The cost of the first year was calculated at 60,000*l.*: 170,000 tons of stone have been deposited, and 500 yards in length of the mole are already apparent above low water, and the expence so far has been

considerably within the estimate presented by Mr. Rennie to the lords of the admiralty. At a more advanced state of the business, it is contemplated to erect a cut-stone pier on the top of the great breakwater, and build two light-houses on each extremity, to assist ships entering the sound.

The *Eddystone light-house*, at the mouth of the sound, five leagues south of Plymouth, is necessarily an appendage of the most important kind to the harbour, without which the entrance to it would be extremely dangerous. There is a duty payable by ships passing the light-house, which is collected at all the neighbouring ports. Merchant ships only are subject to this tax, those belonging to the king are free. For an account and history of the Eddystone light-house, see vol. xii.

*Stonehouse* is a populous town, containing about 5000 inhabitants, situated on the road leading from Plymouth to Plymouth-dock, and almost connecting the latter with the former by the continuation of buildings. The streets are generally irregular, but most of them paved, and the houses handsome and convenient. Stonehouse bridge, erected over a small creek of the same name, is a neat stone fabric of one arch. The revenue arising from its toll is considerable, and passes to the lords of the manor. Stonehouse has ever been the property of individuals; as early as the 27th of Henry III. it belonged to Joel de Stonehouse, and has since, by various marriages, passed into the family of Mount Edgcombe. By the last census the number of houses was found to be 566, and the population 5174. There are a chapel, work-house, and market-place; but the most important public buildings are the Royal Marine barracks, a handsome range of uniform granite edifices, in the form of a quadrangle, and capable of containing upwards of 1000 men, with their officers. At Stonehouse, and connecting it with the borough and town of Plymouth, is the Royal Naval hospital, which is an immense establishment, under the superintendance of a governor, lieutenants, and medical officers. Besides the chapel, dispensary, and officers' residences, there are seven large, commodious buildings surrounding the lawn, each containing six wards, and capable of accommodating 959 persons, officers and sailors. The sick and wounded are brought in boats from their ships, and landed at a quay immediately adjacent to the hospital. The Royal Military hospital, of a more recent erection than the former, is situated on the opposite bank of the stream, and consists of only four distinct buildings. Its government is similar to the other. Adjacent to Plymouth are several inland towns and villages of minor consequence. St. Budeaux, about five miles north of Plymouth, is a pleasant village, formerly the property of sir William Gorges, the only descendant of whom is said to be the celebrated Gorges, who commanded the Chouans in Brittany during the latter part of the French revolution. The church is a plain simple edifice, erected in the 14th century, with the materials of an older structure. Buckland-Monachorum is entitled to notice for its handsome church, consisting of a nave, side aisles, transepts, a tower, with turrets and pinnacles. The remains of the Drake family are deposited here, with several handsome monuments to their memory, as well as to that of lord Heathfield, the brave commander at the famous siege of Gibraltar. There are also the villages of Lipson, Widey, Tamerton, Crabtree, and Compton. Polwhele's History of Devonshire, folio. Beauties of England, vol. iv. Picture of Plymouth.

*PLYMOUTH-Dock*, sometimes denominated *Dock*, in the hundred of Roborough, and parish of Stoke-Damerell, Devonshire, is situated west of Plymouth, with the town

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of Stonehouse only intervening. It is placed on the eastern bank of Hamoaze. The manor, excepting a part of the dock-yard, is the property of the St. Aubyn family, who inherit it from sir William Morice, secretary of state to Charles II., and mentioned by Clarendon as instrumental to the restoration. In this family rest the presentation to the living of Stoke-Damerell. The streets are regular, intersecting each other at right angles, and generally well built. The pavement is of the marble with which the neighbourhood abounds, and after a shower its veins have a beautiful appearance. Though of such considerable magnitude, it is wholly of modern date, and owes its origin and rapid increase to the establishment of the dock-yard and naval arsenals. It was made a king's yard in the latter part of the reign of William III., before which it was a mere hamlet of a few houses. The greater part of the town has been erected since 1760. The number of inhabitants in Dock is about 25,000, and the houses 2400. They are erected by the inhabitants on leases for ninety-nine years, subject to a small annual quit rent. The town and the dock-yard are defended by lines. They were commenced in the reign of George II., but the works have been much improved under an act made in the 21st of his present majesty, George III. On the north-east and south sides the town is bounded by a sod wall, about twelve feet high, which was built in 1787. The western side is skirted by the walls of the dock-yard and gun-wharf. Without the lines is a ditch from twelve to eighteen and twenty feet deep, excavated from the solid slate and limestone rock. In this line of fortification are three barrier gates; the North barrier, the Stoke barrier, and the Stonehouse barrier. Round the whole extent are planted pieces of ordnance, at regular distances. The other fortifications are a battery on mount Wise; another at the Obelisk hill; and a redoubt or block-house on mount Pleasant, without the lines, which command the whole. It is in contemplation to fortify the town regularly, and the business is actually begun; but the dock-yard may be commanded from many of the adjacent eminences, all of which must be fortified also, at an expence that would erect several distinct yards! The town, being circumscribed by this boundary of defence, does not admit of any increase of building within it. A new town without the lines, named Morice-town, is also the property of the St. Aubyn's family. Dock has two chapels, and several meeting-houses for sects of different denominations, which are very numerous. The parish church is situated about a mile from the town. There are few charitable institutions, perhaps in consequence of the recent growth of the town. The poor-house is extensive, and will contain nearly 300 persons: picking oakum for the dock-yard affords constant employment to its inmates. The town, not being incorporated, is under the jurisdiction of the county magistrates, who hold their sessions quarterly here. The inhabitants are supplied with water from the springs on Dartmoor, by an aqueduct similar to that of Plymouth. Markets are held three days in the week in the new market place, lately erected by sir John St. Aubyn. The government house is a handsome building, erected when lord Lennox commanded here; it is appropriated solely to the dispatch of military business, court-martials, &c. and has in front a grand parade. Here are eight different barrack establishments, which afford conveniences for 3000 men. The naval department consists of an admiral and rear admiral, deputy judge advocate, and commissioner for the payment of seamen's wages. Near the grand parade stands the telegraph, by which a communication is kept up with the Admiralty in London,

through thirty-six different stations. Instances have occurred of a short message being transmitted to London, and an answer returned, in fifteen minutes. (See *POST* and *TELEGRAPH*.) The dock-yard, even in its present unfinished state, is acknowledged to be one of the finest in the world. When it was first used as a naval arsenal is uncertain; but as the basin and its dock are the most ancient, and were not made till the reign of William III., it seems evident that this was a place of little consequence before that period. The wall, which separates the yard from the town, is of slate and limestone, and in some places thirty feet high. The area within the wall is seventy-one acres and thirty-six poles; including the projecting parts of the jetties. The entrance to the dock-yard from the land side is from Fore-street, by a large gate for carriages, &c., and a small one for foot passengers. No person is suffered to enter, unless well known, or in uniform, without an order from the commissioner. Immediately within the gates is the master porter's house; and close by is the chapel, the tower and one aisle of which are as old as 1700, the other aisle is of much more recent date. In front of the chapel is the military guard-office, and over that the navy pay-office. From the gates, a flat paved road, skirted with elms, leads to the officers' dwelling-houses, which are of brick, and thirteen in number. From hence to the lower part of the yard, which has been levelled from the solid rock, is a descent by a flight of steps, leading to two handsome buildings, the northernmost of which is the joiner's shop, the other is used as an office. Directly in front of these is the basin and dock, made in the reign of William III. The basin is a large excavation, in which all the boats belonging to the yard, as well as the launches employed in moving ships, are kept; the water flows into it through an opening about seventy feet wide. Within the basin is a dock, sufficiently capacious for a seventy-four gun ship; its length is 197 feet 3 inches; its width, 65 feet 10 inches; and its depth, 23 feet 1 inch. The basin is bounded on each side by jetty-heads, which are platforms projecting over the sea, supported by wooden pillars driven full of nails, to prevent the worms from perforating them. Ships of all sizes lie alongside these jetties without grounding, and here all vessels are brought to be fitted out. On the fourth jetty is a landing place, called the master attendant's stairs, where all stores returned from ships are landed, and those to be sent to them shipped off. Adjoining this jetty is the rigging house, a handsome building, 480 feet long, and three stories high, forming one side of a quadrangle. This fabric is of lime-stone, with the coars and cornices of Portland stone. Within it the rigging for the ships of war is kept in such a state of forwardness, as to be fit for use at a very short notice. Over the rigging is the sail loft, where all the sails are cut out and made. The remaining three sides of the quadrangle are store-houses, in which the various articles necessary to equip the fleets are kept. Advancing southward is a slip for hauling up and graving the bottoms of small vessels, such as sloops of war, cutters, &c. Beyond this is the Camber, a long canal, about seventy feet wide, terminating at the upper end in a basin, where boats lie; on the north side of which is the boat-house, where boats are built and repaired. Here, before the year 1768, were the bounds of the yard; all thence to the southward is still called the "new ground." The blacksmith's shop is situated south of the canal; it is a spacious building, about 210 feet square, and contains forty-eight forges. The largest anchors made here weigh five tons; they are made of iron bars forged together, and are moved in and out of the fire by the aid of cranes. The

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The quantity of coals burnt in 1802 was 876 chaldrons and 23 bushels. The anchor-wharf fronts the blacksmith's shop. Near this wharf are three slips, whereon large ships are built; and adjoining them is a boiling-house, in which the planks that are to receive a particular curve are boiled in water for a considerable time, and being afterwards applied hot to their places are immediately fastened. Northward of the slips are the mast-house and pond; in the former the different masts and yards are made of many pieces of balk, formed to fit into each other, then rounded and pressed together with iron hoops driven on red-hot. The pond is a large piece of water, inclosed from the sea by a very strong wall, of at least 10 feet in thickness, and about 380 feet long; the top of which is laid flat with large flags of coarse granite. The water flows in through two openings about forty feet wide, over which are light wooden bridges. An immense number of masts, yards, &c. are always kept in this pond, to prevent their cracking, from exposure to the sun. Near the south end of the mast-house is a small mount, generally called "Bunker's Hill," on the summit of which is a watch-house and a small battery. Under this hill is a small powder magazine, and near it a slip for building cutters and small vessels. Returning from the interior of the yard, the rope-houses first engage the attention. These are two buildings of limestone, two stories high, and twelve hundred feet long, running parallel to each other. In the upper stories twine is made, and yarns prepared for the cables, which are *laid* (twisted together) below. The largest cables that are made are 25 inches in circumference, and 100 fathoms long; they weigh 116 cwt. 1 qr. and 16 lb., and contain 3240 yarns. One of these buildings was partly consumed by an accidental conflagration in June 1812. The whole of the machinery was destroyed, and only 400 feet of the rope-house saved. The loss was estimated at 15,000*l.* In 1776 considerable alarm was excited from an attempt of John Aitken, commonly called "Jack the painter," to destroy the dock-yard with fire; he was afterwards detected in a similar endeavour at Portsmouth, and hanged. (See PORTSMOUTH.) The mould or model loft, where the different parts of ships to be built are laid down according to plans sent from the Navy Board, is in front of the store-house, and is the last building of importance in that part of the yard south of the basin. On the north jetty is a landing place, called the North-stairs, where officers not on duty generally land. Near it is a house, where pitch is kept continually boiling, to be applied to the bottoms and seams of ships. The double dock is the first of three, very near each other, for line of battle ships, and so denominated from its capability of containing two ships at the same time. The dock gates, by which the water is kept out of the docks, form, when closed, the segment of a circle, with its convex side toward the sea: they are made of timbers strongly put together and hung on each side of the mouth of the dock. As soon as a ship is taken into dock, which is always at high water, the gates are shut and locked; the water within the dock then runs out through sluices made for the purpose, till the ebb tide has ceased; the sluices are then shut, and the water which may still remain is thrown out by engines on the plan of pumps, worked by horses. The ship is taken out by opening the sluices, and suffering the water to attain an equal height within as without, when the gates are opened without difficulty. The second dock, called the Union, or North dock, is 239 feet 4 inches long, 86 feet 7 inches wide, and 26 feet 10 inches deep, and is faced with Portland stone. The New Union, or North New dock, 259 feet 9 inches long, 85 feet

3 inches wide, and 27 feet 8 inches deep, was made in the year 1789, and is on the same plan. Near the head of this latter dock is the burning place for old copper; and further northward, are the plumbers', braziers', and armourers' shops, and the bricklayers' and stone cutters' yards. Behind all this side of the yard, the rock, having never been levelled, rises very high and irregular: on it are a few sheds and storehouses. Every person belonging to the dock-yard is under the command of the commissioner, from whom all orders are received, and who has it in his power to discharge workmen for neglect of duty. The gun-wharf is separated from the dock-yard by North-corner street; it was begun in 1718 or 1719, and completed about 1785. The buildings are in general good, but very heavy, and in the Dutch style. They were projected by the late sir John Vanburgh, who was then attached to the ordnance department. The quantity of ground within the walls is four acres and three quarters. Here are two principal store-houses, of three stories high, for 80,000 muskets, pistols, and other small stores; a number of sheds for gun-carriages, &c.; a powder magazine, and a cooperage. The dock-yard, as well as the gun-wharf, is rated to the poor, and pays house and window-tax for the dwellings; but neither tithes, church rates, nor land-tax. The diversity of employments, ingenuity, and manual activity, exhibited in the various departments of the dock-yard, present a very interesting spectacle to those who have not been accustomed to appreciate the effects of human industry on a large scale. The bay or estuary of Hamoaze, on which the dock-yard is situated, is a commodious basin about four miles long, and half a mile wide, where in times of peace a very considerable part of the English navy is laid up in ordinary. The port admirals, hospital and prison ships, are always stationed here, and those that have undergone, or are about to receive repair in the dock. The ships are moored by large chains of iron, sixty fathoms long, consisting of 120 links, and having at the end a large anchor. On the banks of this harbour are other establishments of government: the powder magazine, higher up, consists of several detached stone buildings; the powder-kilns, erected for drying damaged powder; and on the bank of a creek of the harbour running to the S.W. is the South-down brewery, where all the beer for the fleet is brewed. In the vicinity of Dock are several small towns, of which Stoke is the most important. It is an ancient village, and has considerably enlarged itself within a few years. The church is situated at a short distance from the town, consisting of three aisles and a tower: the period of its erection is unknown. Moricetown, on the north side of Dock, near the ferry which crosses the Tamar, is increasing very fast in size and consequence. There are other villages in the neighbourhood, which will be treated of in our description of *SALTASH*. Immediately opposite to Dock is the delightful peninsula of Mount-Edgecumbe, the seat of the earl of Mount-Edgecumbe. The mansion was completed in the reign of queen Mary, and is antiquated in its appearance. It contains a few good paintings and portraits, and is pleasantly situated on the side of a wooded hill, from whence the prospect is variegated and comprehensive. The grounds occupy an area of about three miles in circumference, and are divided into parks, lawns, woods, terraces, kitchen and flower gardens. The estate became the property of the present family about the beginning of the 16th century from an intermarriage; by which connection they also became the proprietors of Stone-house. On the heights bordering the park of Mount-Edgecumbe stands Maker-church, the tower

tower of which is used as a medium for conveying signals from the admirals' ships in Hamoaze to ships in the Sound, and also to forward the information of any fleets or vessels of war in the offing, or passing up or down Channel. Polwhele's History of Devon, folio. Beauties of England, vol. iv. Picture of Plymouth and Dock.

PLYMOUTH, a maritime county, in the eastern part of the state of Massachusetts, containing 35,169 inhabitants, and subdivided into 18 townships, of which Plymouth is the chief. Within the counties of Plymouth and Bristol there were, in 1796, in actual work, 14 blast and six air-furnaces, 20 forges, seven slitting and rolling mills, besides a number of nail shops, and others for common smithery. These furnaces, supplied from the neighbouring mines, produce annually from 1500 to 1800 tons of iron-ware. The forges, at an average, manufacture more than 1000 tons annually, and the slitting and rolling mills at least 1500 tons. The manufactures of these mills have given rise to various others dependent upon them, such as cut and hammered nails, spades, and shovels, card teeth, saws, scythes, metal-buttons, cannon-balls, balls, fire-arms, &c. In these counties are also manufactures of hand-bellows, combs, sheet-iron for the tin-manufacture, wire, linseed oil, snuff, stone and earthen ware. The iron-works, called the Federal furnaces, are seven miles from Plymouth harbour.

PLYMOUTH, the capital of the above county, is a post-town and port of entry, 42 miles S. from Boston, to which belongs an extensive township, more than 80 square miles, is about 16 miles in length, and more than five in breadth, containing, by the census of 1791, 2495 inhabitants, and in 1810, 4228. The town, or principal settlement, containing more than two-thirds of the inhabitants, lies on the N.E. part of the township, near a stream, called the "Town-brook," which flows from a large pond, bearing the name of "Bellington sea." The principal street crosses the stream, and is intersected by three cross streets, extending to the shore; another street runs westerly on the N. side of the brook. The town is compactly built, and contains about 200 dwelling houses, a handsome meeting-house, court-house, and gaol. Here are two precincts, one including the town and the district of Hobbs-Hole and Eel river; the other at Monument Ponds, a village about seven miles E. from the town, beyond the highlands of Monument. The soil near the coast is generally good; the residue of the township is barren, and remains a forest, consisting partly of pine and partly of oak. The harbour is spacious, but shallow; formed by a long and narrow neck of land, called "Salthouse beach," extending southerly from Marshfield and terminating at the Gurnet head, and by a smaller beach within, running in an opposite direction, and connected with the main land near Eel river, about three miles from the town. On the Gurnet is a light-house, and on Salthouse-beach is placed one of the huts, erected and maintained by the Humane Society of Massachusetts, for the reception and relief of shipwrecked mariners.

The principal business of the town is the cod-fishery, employing about 2000 tons of shipping and about 300 men annually. Many of the fishing vessels make voyages to the southern states in the winter season. The exports in 1795 exceeded 70,000 dollars, and in 1796 amounted to near 130,000 dollars. The produce of the fishery was formerly sold at Boston, or Salem; but it is now almost wholly exported from the town. The proceeds of the foreign voyages are generally conveyed to Boston for a market. During the war for independence, Plymouth suffered much, and was reduced to a state of great distress; but it has

since revived, and both the town and its environs have been improved. A stage passes to Boston twice a-week, and an aqueduct is constructed for bringing fresh water to the inhabitants. The township abounds with ponds (amounting to more than 100) and streams. Bellington sea covers near 300 acres, about two miles from the town, and from it runs a stream, which supplies the aqueduct. South pond is much larger. Many of the ponds abound with white and red perch, pike, and other fresh-water fish, and in the numerous brooks which run into the sea are found excellent trout. These ponds and streams are frequently scenes of amusement for parties of both sexes, in the summer season. At the villages of Monument Ponds and Eel river, and in some other parts of the township, many of the inhabitants are farmers; and in the town the gardens are numerous and well-cultivated, and aided by the aqueduct will furnish a supply adequate to the wants of the inhabitants.

The situation of the town is pleasant and healthful, but the easterly winds of the spring are noxious. Although the market is not regularly supplied, fowl, fish, poultry, and wild fowl are plentiful, and cheaper, perhaps, than in any other sea-port of the same size. The people are sober, industrious, and friendly. Plymouth is the first settlement in New England, in 1620, but is peopled, principally, by the descendants of the ancient stock, intermixed with a few foreigners. The rock on which their forefathers first landed, was conveyed, in 1774, from the shore to a square in the centre of the town. Although fishing and foreign commerce engage at present almost the whole native capital of the town, a variety of circumstances will probably render it, at some future period, a considerable manufacturing town.

PLYMOUTH, a town in Litchfield county, Connecticut, containing 1882 inhabitants.—Also, a port and half-shire town in Grafton county, New Hampshire, on the S. side of Baker's river, at its mouth, where it falls into the river Pemigewasset; 45 miles N. of Concord; incorporated in 1763, and containing 937 inhabitants.—Also, a town of New York, in Onondago county; lying about 12 miles S.E. of Geneva, on a beautiful declivity on the E. side of Seneca lake, and commanding a view of the whole lake. The situation is healthful and pleasant, well watered by copious springs: more than twenty houses were built here in 1796. The new state road intersects this town, and here is a ferry across the lake to another thriving town on the opposite side.—Also, the name of two townships in Pennsylvania, one in Luzerne county, and the other in that of Montgomery; the former has 765, and the latter 895 inhabitants.—Also, a town of North Carolina, about 20 miles from Edenton, and a place of considerable trade; the navigation is free and open, and the two places have a constant communication across Albemarle sound.—Also, a settlement on the S. peninsula of St. Domingo, in the dependence of Jeremie.—Also, a township in Windsor county, Vermont, formerly Saltash, 12 miles W. of Windsor; containing 834 inhabitants.

PLYMOUTH Town, a town in the island of Tobago. N. lat. 10° 10'. W. long. 60° 3'.

PLYMOUTH Marble, among our *Artificers*, a term used for a sort of marble dug in great plenty about Plymouth, and in some parts of Devonshire, where it lies in very thick strata, and whence it is brought in large quantities to us; and when wrought looks little less beautiful than some of the Italian marble.

It is very hard and firm, and of a beautiful texture; its ground is a blueish-white, and its variegations are principally a pale red, and in smaller quantities brown and yellow: these

these lie in very orderly beds, and often there is a very agreeable glow of a faint red diffused through the whole substance. It is remarkable even in its whole structure, and is therefore capable of a more than ordinarily elegant polish.

PLYMPTON, a township in Plymouth county, Massachusetts; 45 miles S.E. of Boston, containing 900 inhabitants.

PLYMPTON-MAURICE, or EARLS-PLYMPTON, a borough and market town in the hundred of Plympton, and county of Devon, England, is 216 miles W.S.W. from the metropolis, and 39 miles S.W. from Exeter. According to the population returns of 1811, it contains 92 houses, and 715 inhabitants. It is one of the stannary towns, and formerly constituted part of the honour of Plympton, to which no fewer than eighty-nine knight's fees were appendant, when it was granted by Henry I. to Richard de Rivers, or Redverse, earl of Devonshire. That nobleman built here a magnificent castle, and made it the capital seat of his barony. He and his successors likewise conferred upon the town considerable privileges. Baldwin de Rivers granted it a charter of incorporation, which was successively confirmed and extended by Edward III., Richard II., and Henry V. and VI. Queen Elizabeth granted a new charter, under which the town is now governed by a mayor, a recorder, eight aldermen, a bailiff, and a town clerk. The mayor is invested with the powers of a justice of the peace, and holds a court of record at stated intervals.

Plympton sends two members to parliament, and has done so, though irregularly, since the reign of Edward I. These are elected by the mayor and free burgesses, who are estimated at one hundred in number. The mayor is the returning officer. The market day here is Saturday every week; besides which there are four annual fairs. The houses are chiefly disposed in two streets, extending at right angles with each other in the form of the Roman letter T. The church is only a chapel annexed to the church of Plympton St. Mary, an adjoining parish and village. The living is a curacy, in the patronage of the dean and canons of Windsor. The other public buildings are a guildhall and a free-school. The guildhall is an ancient structure supported on stone pillars, and contains, among other portraits, one of sir Joshua Reynolds, painted by himself. The free-school was erected in 1664, by one of the trustees of Elizeus Hele, esq. of Fardel, who bequeathed 1500*l.* per annum, to be expended in charitable purposes. Of this school, the father of sir Joshua Reynolds was master for many years, and in the master's house belonging to it the celebrated artist himself was born on the 16th July 1723. See REYNOLDS.

PLYMPTON St. Mary, above-mentioned as adjoining to Plympton-Earls, is a village and parish of very considerable antiquity. The church was formerly collegiate for a dean or provost, and four prebendaries with other ministers. This college is said to have been of the foundation of one of the Saxon kings. It was dissolved by William Warlewast, bishop of Exeter, on the refusal of its religious to discard their wives in obedience to the decrees of the synod, held in London A.D. 1102, by which celibacy was enjoined to the clergy. That prelate afterwards settled here a prior and canon regular of the order of St. Augustin. The benefactions conferred on this priory by earl Baldwin and others were immense, and rendered it the richest monastic institution in the diocese of Exeter. Its revenues at the time of the dissolution were valued at 912*l.* 12*s.* 1*d.* per annum. The site was granted by queen Elizabeth to Arthur Champenon, esq. Here was also an hospital for lepers. The parish of Plympton St. Mary, exclusive of

Plympton-Earls, contains, according to the parliamentary returns of 1811, 272 houses, 1727 inhabitants.

Near Plympton is Boringdon, the ancient seat of the Parkers, and now the property of their representative John Parker, earl of Boringdon. The mansion which was built in the fourteenth century has been converted into a farmhouse, and has consequently undergone great alteration and diminution since the removal of the family seat to Saltram, in the neighbourhood, by lady Catharine Parker. Saltram is remarkable for the beauty of its situation; for exclusive of the diversity of landscape displayed by the surrounding pleasure grounds, the prospects which it commands "of Plymouth sound, the town, citadel, Mount Edgecumbe, and the endless variety of effects peculiar to the sea and harbour, are extremely interesting and amusing." The house is the largest in the county, and contains a valuable collection of paintings by ancient and modern masters. Beauties of England and Wales, vol. iv. by John Britton, F.S.A. and E.W. Brayley.

PLYNTERIA, Πλυντήρια, in *Antiquity*, a festival in honour of Aglaurus, the daughter of king Cecrops, or rather of Minerva, who had from that lady the name of Aglaurus. These were the holidays of Minerva, which was reckoned unlucky, at which time, according to Xenophon, they shut up the temples of that goddess. It was expressly forbidden to pursue any work whatever on the day of this festival, even in cases of necessity. It was then allowable by the law of Solon to swear by the three names of Jupiter Propitious, Expiator, and Defender. For the ceremonies observed at this solemnity, see Potter, *Archæol. Græc.* lib. ii. cap. 20. tom. i. p. 425.

PNEUMA, Πνευμα, in Hippocrates, sometimes imports spirit, air, or vapour, and frequently it signifies the breath, that is, the air drawn in by inspiration, and expelled during expiration. But pneuma, by the above quoted author, is often used to express a difficult, short, and laborious respiration.

PNEUMATICS, PNEUMATICE, called also *Pneumatology* and *Pneumatosophy*, the doctrine and contemplation of spirits, and spiritual substances.

The word is formed of the Greek πνευμα, *spiritus, breath*; whence, from the different acceptations of that word either as an incorporeal substance, or as air, there arise two sorts of pneumatics.

PNEUMATICS, in the *Schools*, is frequently used for the doctrine of spirits; as God, angels, and the human soul. See SPIRIT.

In this sense pneumatics coincide with what we otherwise call metaphysics.

PNEUMATICS is more commonly used among us for the doctrine of the air; or that part of natural philosophy which treats of the nature, properties, and effects of the air.

Some make pneumatics a branch of mechanics; because it considers the air in motion, with the effects of it. It is certainly a sister of hydrostatics; the one considering air in the same manner that the other does water.

Wolffius, in lieu of pneumatics, uses the word *aerometry*, *q. d.* the art of measuring the air.

The doctrine and laws of pneumatics will be found under AIR, ATMOSPHERE, ELASTICITY, GRAVITY, COMPRESSION, CONDENSATION, RAREFACTION, EXPANSION, &c.

PNEUMATIC Engine, *Machina* or *antlia pneumatica*, denotes the air-pump.

PNEUMATIC Sect of physicians, a subdivision of the methodic sect, which took place at Rome, and is ascribed to two or three different persons, who are severally esteemed its founders.

founders. The chief distinction of the pneumatic sect, consisted in referring to a particular spirit, or *pneuma*, which they considered to arise from the heart and arteries. See *MEDICINE, History of*.

**PNEUMATOCELE**, from *πνευμα*, *wind*, and *κελε*, a *tumour*, in *Surgery*, a swelling containing air: also a wind rupture; a complaint which is spoken of by many surgical writers; but has no real existence. Hernial tumours do, indeed, sometimes include air, which is combined within the protruded bowel, or else produced in the cellular membrane from putrefaction in the sloughing state of the disease. Yet it is not the accidental presence of such air that constitutes the rupture or hernia; but the protrusion of some of the viscera from the cavity of the abdomen.

**PNEUMATODES**, a word used by Hippocrates to express a person who fetches his breath short and quick: and sometimes for one who has his belly or ilia much distended by flatulencies. *Pneumatias* is also used in the same double sense.

**PNEUMATOMACHI**, *Πνευματομαχοι*, in *Ecclesiastical History*, ancient heretics, so called, because they opposed the divinity of the Holy Spirit, placing him in the number of creatures.

**PNEUMATOMPHALOS**, from *πνευμα*, *wind*, and *φουλας*, *the navel*, in *Surgery*, a rupture of the navel, containing air, or supposed to be produced by wind.

**PNEUMATOSIS**, in *Medicine*, from *πνευμα*, *air*, a term denoting large accumulations of air in any cavity of the body. It may include, therefore, not only *tympanites*, but *emphysema*. In this sense Sauvages employs the term, and describes four species of pneumatosis; the first he calls *spontanea*, as it arises without any evident cause; the second, *traumatica*, which originates from wounds of the lungs, whence the air is permitted to escape into the cellular membrane of the whole body; the third, *venenata*, arising from poisons; and the fourth, *hysterica*, when the air is confined to the stomach and intestines. (See his *Nosol. Method. class. x. gen. 5.*) See also *EMPHYSEMA*.

**PNEUMONANTHE**, in *Botany*, a name given by many botanical writers to a species of gentiana, called also by some the *calathian violet*.

**PNEUMONIA**, in *Medicine*, from *πνευμων*, *the lungs*, signifies an inflammation of the lungs and its investing membrane. It includes, therefore, both the forms of the disease, *peripneumony* and *pleurisy*. See *PERIPNEUMONY*.

**PNEUMONICS**, *Πνευμονικα*, medicines proper in diseases of the lungs, in which respiration is affected.

The word is formed from the Greek *πνευμων*, *lungs*, or *πνευμα*, *spiritus, breath*.

Of this number are sulphur, lung-wort, hyssop, ground-ivy, and colt's-foot; they are used in phthises, asthmas, peripneumonies, pleurisies, &c.

**PNEUMORA**, in *Entomology*, a genus of insects of the order Hemiptera. The generic character is; body ovate, inflated, diaphanous; head inflexed, armed with jaws; thorax convex, carinate beneath; wing-cases deflected, membranaceous; legs formed for running. There are three species of this genus, and they all appear to consist of a mere hollow inflated membrane; by rubbing together their serrate or toothed legs, they make a shrill kind of noise morning and evening; and they follow a light; they are so nearly allied to the cricket tribe, that they have been ranked by Fabricius with the *Gryllus* genus.

Species.

**IMMACULATA**. Green spotted with white; wing-cases  
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immaculate. It inhabits the Cape of Good Hope. In Fabricius it is the *Gryllus papillofus*.

**MACULATA**. Wing-cases green, with square white spots.

**6-GUTTATA**. Wing-cases green, with two white spots; abdomen with three white spots on each side. This is found at the Cape of Good Hope.

**PNIGITIS TERRA**, in the *Materia Medica of the Ancients*, a name given at different periods of time to two different species of earth: the terra pnigitis of Dioscorides and Pliny being a grey marle, and the pnigitis of Galen a black clay.

The last of these is said to be a very valuable astringent, and is found in many parts of this kingdom, particularly in the neighbourhood of London, and well deserving to be introduced in the practice of physic.

**PNIGMOS**, from *πνιγε*, *I suffocate*, in *Medicine*, a kind of suffocation, from whatever cause: it is very often used to express that of hysterical fits in women.

**PNIX**, a word used by physicians to express the suffocation from hysterical fits, or any other cause.

**PO**, in *Geography*, *Padus*, (which see,) a river of Italy, which rises in mount Viso, at the N.W. part of the marquisate of Saluzzo, seven miles N. of Chateau Dauphin, traverses a part of the marquisate of Saluzzo, the province of Chieri, the duchy of Montferrat, the Milanese, Mantuan, and Ferrarese, and runs into the gulf of Venice, by a great number of mouths.

**Po**, *Department of*, one of the six departments into which Piedmont was divided, after having been united to the French republic, August 26, 1802, the other five being Doire, Sesia, Marengo, Tanara, and Stura. This department is formed of the district of Turin, quatre-vallois, and the marquisate of Susa, in N. lat. 45°, lying between Doire and Stura, and on the W. and N.W. bounded by the Alps, containing 264 square leagues, and 395,193 inhabitants. It is divided into three circles, *viz.* Susa, including 61,236 inhabitants; Turin, 232,313; Pignerol, 101,634. Situated at the foot of the Alps, and broken into vallies, hills, and plains, the soil of this department is of various qualities. The plains and vallies, in general, are fertile. In the mountains are mines of copper, lead, iron, quarries of marble, stone, slate, &c.

**Po**, *Lower*, a department of the new kingdom of Italy, composed of the duchy of Ferrara, and the valley of Comacchio.

**Po**, *Upper*, a department of Italy, formed of the Cremone, the Cremasco, and the Lodofan.

**Po**, *the Vale of the*, one of the four regions into which Italy may be divided; it extends about 260 miles in length, and in breadth, where widest, 150. It is bounded by the Alps and Apennines on the N., W., and S., and on the E. lies open to the Adriatic. The second region is the tract inclosed by the Apennines, forming the Roman and Tuscan territories. The third is confined to the Campania Felix, and its immediate dependencies, such as the borders and the islands of the bay of Naples, and of the plains of Poestum. The last consists of Abruzzo, Apulia, Calabria, and the southern extremities of Italy.

The first of these regions has been represented by many, as perhaps the most fertile and the most delicious territory in the universe. It owes this fertility to the many streams that descend from the bordering mountains, and furnish a constant supply to the majestic river that intersects it. Mr. Eustace, in the second volume of his "Classical Tour," avoids the name frequently given to the plains of the Po or of Milan. *Lombardy* (which see) is, he says, a barbarous  
5 D appellation,

appellation, derived from one of the fiercest tribes that invaded and wasted this delicious region. After more than two centuries of devastation and restless warfare, they were exterminated by Charlemagne; and our author does not see why their name should survive their existence, or why a barbarous term should displace a Latin appellation.

Po, a city of China, of the second rank, in Kiang-nan; 260 miles S.S.W. of Peking. N. lat.  $33^{\circ} 45'$ . E. long.  $115^{\circ} 14'$ .—Also, a town of China, of the third rank, in Chan-tong; 262 miles S. of Peking. N. lat.  $35^{\circ} 48'$ . E. long.  $115^{\circ} 14'$ .

POA, in *Botany*;  $\rho\alpha\alpha$ , a general name for *grasses*, or *herbage*, is appropriated by Linnæus to this, one of the most common and copious genera of the grass family.—Linn. Gen. 34. Schreb. 49. Willd. Sp. Pl. v. 1. 385. Mart. Mill. Dict. v. 3. Sm. Fl. Brit. 95. Prodr. Fl. Græc. Sibth. v. 1. 53. Schrad. Germ. v. 1. 278. Ait. Hort. Kew. v. 1. 153. Brown Prodr. Nov. Holl. v. 1. 179. Pursh North-Amer. v. 1. 78. Juss. 32. Lamarck Illustr. t. 45. Michaux Boreal-Amer. v. 1. 67.—Class and order, *Triandria Digynia*. Nat. Ord. *Gramina*.

Gen. Ch. *Cal.* Glume of two ovate, pointed, awnless valves, collecting the numerous florets into a two-ranked ovate-oblong spikelet. *Cor.* of two ovate, sharpish, concave, compressed valves, rather longer than the calyx, membranous at the edges. Nectary of two acute or torn leaflets, gibbous at the base. *Stam.* Filaments three, capillary; anthers forked at each end. *Pist.* Germen superior, roundish; styles two, reflexed, villous; stigmas feathery. *Peric.* none, the corolla unites itself to the seed, and does not separate. *Seed* one, oblong, pointed, compressed at each side, covered by the corolla.

Obs. In some species the florets are connected at the base by a fine web of folded silky threads.

Ess. Ch. Calyx of two valves, many-flowered. Spikelet rounded at the base. Corolla of two ovate, rather acute, awnless valves, membranous at the edge.

Of this large and valuable genus the 14th edition of Syst. Veg. contains 33 species; Willdenow reckons up 61; but we suspect the last of these, *P. plumosa*, not to be different from his n. 38, the Linnæan *tenella*. The British species are 18, which we shall particularize, along with a few of the most remarkable exotic ones. Mr. Brown describes 21 *Poeæ*, mostly new, in his New Holland Prodrômus.

*P. aquatica*. Reed Meadow-grass. Linn. Sp. Pl. 98. Willd. n. 1. Engl. Bot. t. 1315. Curt. Lond. fasc. 5. t. 12. Knapp. t. 44. (Gramen aquaticum majus; Ger. Em. 6.)—Panicke erect, branched, lax. Spikelets six-flowered, linear. Florets obtuse, with seven ribs.—In ditches and about the banks of rivers, perennial, flowering in July, conspicuous for its large size and reedy aspect. Its colour is a light, not at all glaucous, green. *Stem* five or six feet high. *Leaves* flat, acute, broad, straight, rough at the edges and keel, with a nearly smooth sheath, and a short, entire, very blunt *stipula*. *Panicke* very large and numerously branched, the subdivisions rather zigzag, rough. *Calyx* almost equal, whitish, polished. *Florets* from five to eight, scarcely more, nearly cylindrical, somewhat distant, obtuse, rough, purplish at the outer part.

Cattle are said to be fond of this grass, though coarse. It usually makes a principal part of marsh-land hay.

*P. fluitans*. Floating Meadow-grass. Scop. Carn. ed. 2. v. 1. 73. Fl. Brit. n. 2. Ait. n. 2. Engl. Bot. t. 1520. Knapp. t. 45. (Festuca fluitans; Linn. Sp. Pl. 111. Curt. Lond. fasc. 1. t. 7. Mart. Ruff. t. 113. Willd. Sp. Pl. v. 1. 426. Glyceria fluitans; Brown Prodr. N. Holl. v. 1. 179.)—Panicke branched, divaricated. Spike-

lets close-pressed, cylindrical, many-flowered. Florets obtuse, with seven ribs, and intermediate ones at the base.—In ditches and slow rivulets, perennial, flowering throughout the summer, in most parts of Europe. Mr. Brown found it at Port Jackson, New South Wales, the seeds probably having been carried from England by accident. This writer has separated it as a genus from *Poa*, chiefly because of the *stigmas* being repeatedly branched, and the *nectary* a solitary fleshy scale. But the neighbouring species of *Poa*, wanting these characters, seem too strictly akin to this to allow of such a separation. The *root* creeps extensively. *Stems* spreading widely, floating for the most part, with their lower leaves, on the still surface of the water. *Sheaths* long, compressed, striated, smooth. *Stipulas* short, triangular, jagged. The larger branches of the *panicke* spread widely, and are accompanied by short more erect ones. The short intermediate ribs, at the bottom part of each *floret*, afford a peculiar character.

*P. difflans*. Reflexed Meadow-grass. Linn. Mant. 32. Willd. n. 55. Ait. n. 22. Engl. Bot. t. 986. Knapp. t. 47. (*P. retroflexa*; Curt. Lond. fasc. 6. t. 10. *P. salina*; Pollich. Palat. v. 1. 89.)—Panicke branched, spreading; the branches at length reflexed. Spikelets of five, very obtuse, slightly five-ribbed, shining florets.—In meadows, and amongst rubbish, chiefly near the sea, in various parts of England. Jacquin found it in Austria. The *root* is fibrous, perennial. *Stems* several, about a foot high, decumbent at the lower part, striated, smooth to the touch. *Leaves* glaucous, flat, with long *sheaths*, and a blunt emarginate *stipula*. *Panicke* erect, with branches of various lengths, several together, remarkable for being strongly bent downwards as they advance in age. *Florets* much like the *aquatica* in their form and arrangement, but with only five ribs. Vahl in his Symbolæ, v. 2. 19, most unaccountably confounds this grass with Gouan's *P. divaricata*, Willd. n. 56.

*P. maritima*. Creeping Sea Meadow-grass. Hudf. 42. Willd. n. 39. Ait. n. 16. Engl. Bot. t. 114c. Knapp. t. 46. Fl. Dan. t. 251.—Panicke branched, rather close. Spikelets of five bluntish, nearly cylindrical, slightly five-ribbed florets. *Root* creeping.—Native of sandy salt-marshes, in various parts of Europe, flowering in July. Akin to the last, but the creeping *root*, branches of the *panicke* erect after flowering, rarely divaricated, and longer, more acute *florets*, distinguish the present species.

*P. dura*. Hard Meadow-grass. Scop. Carn. ed. 2. v. 1. 70. Sm. Prodr. Fl. Græc. Sibth. n. 181. Schrad. Germ. v. 1. 284. Hoff. Gram. Austr. v. 2. 53. t. 73. (Cynofurus durus; Linn. Sp. Pl. 105. Willd. Sp. Pl. v. 1. 413. Pollich. Palat. t. 1. f. 1.)—Spike nearly simple. Spikelets sessile, alternate, crowded, rigid, obtuse, compressed, all turned one way, of about five elongated ribbed florets.—Native of sandy waste ground in the south of Europe, flowering in May and June. *Root* annual, of many long simple fibres. *Stems* numerous, two to four inches high, spreading in every direction, leafy, rigid, sometimes branched at the base. *Leaves* glaucous. *Spike* ovate, an inch long, rigid, its zigzag smooth stalk visible at the back only. *Spikelets* about a dozen, linear-oblong, glaucous, all their glumes strongly ribbed, and each bordered with a broad white membrane. This species is closely allied to the preceding and the following ones, nor has it any character of *Cynofurus*. It has not been found in Britain.

*P. procumbens*. Procumbent Sea Meadow-grass. Curt. Lond. fasc. 6. t. 11. Engl. Bot. t. 532. Knapp. t. 49. Fl. Brit. n. 5. Ait. n. 3. (*P. rupestris*; With. 146. t. 26. Gramen maritimum, paniculis asperis loliaceis; Bocc.

Bocc. Mus. 135. t. 95.)—Panicle lanceolate, dense, rough, turned one way; common stalk round. Spikelets cylindrical, of about five bluntish, ribbed florets.—Native of sandy inundated waste ground, near the sea, in England, Holland, and Sicily, flowering in summer. The root is annual. Whole plant much like *P. dura*, but more slender, taller, and less rigid, with a doubly compound panicle, not a spike, and far more numerous, smaller, cylindrical spikelets.

*P. rigida*. Rigid Meadow-grafs. Linn. Sp. Pl. 101. Willd. n. 40. Curt. Lond. fasc. 2. t. 4. Knapp. t. 48. Engl. Bot. t. 1371.—Panicle lanceolate, dense, smooth, two-ranked, turned one way; common stalk bordered. Spikelets of seven cylindrical, ribbed florets.—Common on the tops of dry walls, and in barren sandy ground, annual, flowering in June. The whole plant is four or five inches high, of a peculiarly rigid, elastic, wiry habit, and purplish-brown hue. Every part is smaller than in the last.

*P. divaricata*. Straggling Meadow-grafs. Gouan Illustr. 4. t. 2. f. 1. Willd. n. 56. Desfont. Atlant. v. 1. 75. (Gramen phalaroides, sparsâ paniculâ, minimum angustifolium; Barrel. Ic. t. 44. f. 1.)—Panicle capillary, divaricated, with corymbose branches. Flower-stalks club-shaped. Florets four. Leaves brittle-shaped.—Native of the south of France and of Barbary. A small, delicate, slender, annual grass, with the habit of *Aira caryophyllea*, for which the plate of Barrelier has been quoted, a circumstance that has caused some confusion. It flowers in the spring, and has a very elegant aspect. The thickened flower-stalks, and the crowded little shining spikelets, are characteristic of this species.

*P. Eragrostis*. Spreading Meadow-grafs. Love-grafs. Linn. Sp. Pl. 100. Willd. n. 24. Ait. n. 12. Sm. Fl. Græc. Sibth. v. 1. 57. t. 73. Cavan. Ic. t. 92. (*P. megastachya*; Schrad. Germ. v. 1. 288. *Briza Eragrostis*; Linn. Sp. Pl. 103. Willd. Sp. Pl. v. 1. 405. Schreb. Gram. t. 39. *G. eranthemum*, seu *εραγρως*; Barrel. Ic. t. 43.)—Panicle erect, branched, spreading. Spikelets linear, many-flowered. Florets tumid, with three keels. Stipula bristly.—Native of Greece, Barbary, Italy and Switzerland, though not known to Haller as a Swiss plant; see the following species. A very elegant annual grass, with numerous stems, from one to two feet high, quite smooth. Leaves spreading, grass-green; their stipula of many fine hairs. Panicle ample, loose, much branched. Spikelets linear, alternate, stalked, green or purplish, shining. Florets from ten to thirty-six, imbricated, ovate, tumid, roughish, with three distant ribs or keels. The above two plants of Linnæus are certainly one and the same, differing merely as to number of florets. The ripe seed being unconnected with the corolla, makes the plant a *Poa*, not a *Briza*.

*P. elegantissima*. Elegant Meadow-grafs. (*P. Eragrostis*; Villars Dauph. v. 1. 135. Schrad. Germ. v. 1. 287. Schreb. Gram. t. 38. P. n. 1450; Hall. Hist. v. 2. 219. Gramen phalaroides, sparsâ Brizæ paniculâ minus; Barrel. Ic. t. 44. f. 2. *G. paniculis elegantissimis*, minimum; Scheuchz. Agr. 192. t. 4. f. 2.)—Panicle erect, branched, capillary, spreading. Spikelets lanceolate, scarcely ten-flowered. Florets compressed, keeled, three-ribbed. Stipula bristly.—Native of Switzerland, France, and Italy. About one-third the size of the foregoing, with sharper leaves, dark purple tapering spikelets, and about a quarter of the number of florets, which are compressed and keeled, with one obsolete rib at each side, near the edge. This is commonly taken for *P. Eragrostis* of Linnæus, but erroneously, he having never been acquainted with the grass before

us, though he cites some of its synonyms for his *P. Eragrostis* above described.

*P. compressa*. Flat-stalked Meadow-grafs. Linn. Sp. Pl. 101. Willd. n. 42. Ait. n. 18. Knapp. t. 57. Engl. Bot. t. 365. Hofst. Gram. Auftr. v. 2. 51. t. 70.—Panicle dense, turned one way. Stem ascending, compressed. Florets angular, connected at the base by a folded web.—Common in dry fields and on walls, in Europe as well as America. Mr. Pursh says it is known in the last-mentioned country by the name of Blue Grass. It flowers with us in July and August, and has a perennial creeping root. The whole plant is rather glaucous, about a foot high, readily known by its very flat stem, and dense panicle, whose branches spread but for a short period, while in full blossom. Florets from three to nine, closely imbricated, ovate, angular, three-ribbed, bluntish, purple just under the white membranous tip, connected together at the bottom by a set of fine cottony fibres, shorter than in some other species.

*P. alpina*. Alpine Meadow-grafs. Linn. Sp. Pl. 99. Willd. n. 2. Ait. n. 4. Engl. Bot. t. 1003. Hofst. Gram. Auftr. v. 2. 49. t. 67. Knapp. t. 50 and t. 117.—Panicle loose. Spikelets heart-shaped, of about four flowers. Glumes ovate, rather falcate, not connected by a web. Lower stipulas very short.—Native of the mountains of Lapland, Germany, and Scotland, as well as of the Bithynian Olympus, flowering in summer. Root tufted, perennial, with smooth fibres. Stems from four to twelve inches high; leafy below; smooth, shining, often purplish, above. Radical leaves forming a dense tuft; those on the stem furnished with much longer sheaths as well as stipulas. Panicle spreading, short, somewhat ovate, with angular, nearly smooth, branches. Spikelets broad, shining, elegantly variegated with green, white, and a purplish brown. "Florets ovate, acute, membranous at the edge, the lower part of which is silky, and the keel still more so;" several longish hairs, but no complicated web, are found at the base. In wet seasons the flowers are changed into buds, forming young plants, as shewn in Scheuchz. Agrost. t. 4. f. 14, and in Engl. Bot.

*P. flexuosa*. Zigzag Meadow-grafs. Sm. Fl. Brit. 101. Engl. Bot. t. 1123. Knapp. t. 51. Ait. n. 5. (*P. laxa*; Willd. n. 3. Schrad. Germ. v. 1. 291.)—Panicle dense, somewhat drooping, zigzag. Spikelets three-flowered. Glumes ovate, connected by a web. Stipulas all lanceolate.—Discovered on the Scottish mountain of Ben Nevis, by the late Mr. J. Mackay, flowering in July. Schrader mentions it as a native of various alpine situations in Germany. The root is somewhat creeping. This species is of a more slender habit, and paler glaucous aspect, than the *alpina*, and differs essentially in the above characters. The glumes are not silky at the keel nor margin.

*P. bulbosa*. Bulbous Meadow-grafs. Linn. Sp. Pl. 102,  $\alpha$  and  $\gamma$ , not  $\beta$ . Willd. n. 50. Ait. n. 21. Engl. Bot. t. 1071. Knapp. t. 53, with the root of another species. (*G. vernum*, radice alcalonitidis; Vaill. Paris. t. 17. f. 8.)—Panicle slightly zigzag. Spikelets four-flowered. Glumes veinless, connected by a web. Leaves finely serrated. Stem bulbous at the base.—Native of France, Italy, Germany, Switzerland, and England, in dry sandy places. With us it is found only on the sandy sea-coast, over which its little dry bulbs are blown in various directions, during summer, till the first rains of autumn make them vegetate, and take deep root. The plants then yield abundance of short dense herbage, a welcome spring food for cattle, and flower in April or May; having, meanwhile, formed young bulbs, like a minute kind of garlick, which are dispersed, like their predecessors, after the leaves wither. The stems are

naturally three or four inches high; in a garden they rise to above a foot, and the *leaves* are long in proportion. The serrated *foliage*, the *bulbs*, the woolly web connecting the *florets*, and their broad veinless *glumes*, clearly ascertain this species. The *panicle* is small, hoary or silvery, and purplish.—We have gathered this grass for the most part in a viviparous state, on the open ground near St. John Lateran, at Rome, in the early spring. This is probably the variety  $\beta$  of Schrader and other German authors; but the  $\beta$  of Linnæus is a very different, much taller, and greener grass, with long and extremely narrow *leaves*, an elongated *panicle*, of numerous viviparous *flowers*, and peculiarly rough *flower-stalks*. Oriental specimens are in the Linnæan collection, apparently sent by Hasselquist. This is what Scheuchzer has described in his *Agrostographia* 211, and what Morison has figured, *sect.* 8. t. 5. f. 14, after Bauhin's *Theatrum* 32. But the best representation is in Barrelier, t. 703. f. 2. We are afraid to describe this as a species, without seeing some spikelets in a natural state; but we are persuaded it is perfectly distinct, and that there are, besides, other bulbous *Poa*s, hitherto confounded with the true *bulbosa*.

*P. casia*. Sea-green Meadow-grass. Fl. Brit. 103. Engl. Bot. t. 1719. Ait. n. 7.—Panicle spreading. Spikelets ovate, five-flowered. Glumes lanceolate, silky-edged, unconnected by any web. Stipula very short and blunt.—Native of the Highlands of Scotland, flowering in June and July. It seems unknown in every other country. The root is perennial, fibrous, tufted. Whole plant very glaucous. Stems erect, about a foot high, round, smoothish, with two joints near the bottom. Leaves bluntish, flat, rough to the touch, except on the back near the base. Sheaths roughish, about as long as the leaves. Stipula sometimes variable in size and shape. Panicle much branched, rough. Flowers variegated with purple, white, and green, each outer valve marked with a silky line of hairs, near the edges, and on the keel; but there is no complicated web connecting the florets. The doubtful reference to Withering is to be struck out of Fl. Brit., as belonging to our *glauca*, hereafter mentioned, which Mr. Knapp has by mistake figured for *casia*.

*P. trivialis*. Roughish Meadow-grass. Linn. Sp. Pl. 99. Willd. n. 6. Ait. n. 8. Curt. Lond. fasc. 2. t. 6. Knapp. t. 54. Engl. Bot. t. 1072. (*P. dubia*; Leers Herborn. 28. t. 6. f. 5.)—Panicle spreading. Spikelets three-flowered. Glumes lanceolate, five-ribbed, connected by a web. Stem roughish. Stipula elongated.—Very general in meadows and pastures throughout Europe, particularly where the soil is moist, flowering from June to September, and forming perennial tufts of valuable herbage for the food of domestic cattle. The stems are a foot and half high, rough when drawn through the hand, by which this species is known from the equally common and useful *P. pratensis*. The leaves are grass-green, pliant, with sheaths of their own length, crowned with an oblong pointed stipula. Panicle ample and spreading. Florets with five strong ribs, wanting in many of the last described. The web which connects them is copious and long. *P. setacea* of Hudson's first edition is a mere variety, with narrow involute leaves.

*P. pratensis*. Smooth-stalked Meadow-grass. Linn. Sp. Pl. 99. Willd. n. 8. Ait. n. 9. Curt. Lond. fasc. 2. t. 5. Knapp. t. 55. Engl. Bot. t. 1073.—Panicle spreading. Spikelets four-flowered. Glumes lanceolate, five-ribbed, connected by a web, stem smooth. Stipula short and blunt.—Equally common with the last, but it will grow in much drier situations. It flowers rather earlier, comes sooner into leaf, but Mr. Curtis remarks that the *trivialis* produces a better crop as the season advances. That ex-

cellent observer found the smoothness of the stem the best criterion for distinguishing this from the last; which Hudson and Ehrhart have likewise noted. The *panicle* of the present species is most inclined to assume a purple hue; and the web connecting the *florets* is peculiarly long and complicated. *P. angustifolia*, Linn. Sp. Pl. 99, is a trifling variety, whose lower leaves are narrower and more rigid, with roughish sheaths, and the *panicle* is smaller. This variety is figured in Leers, t. 6. f. 3.

*P. humilis*. Short Blueish Meadow-grass. Ehrh. Calam. n. 115. Sm. Fl. Brit. 1387. Ait. n. 10. (*P. subcærulea*; Engl. Bot. t. 1004. *P. cærulea*; Knapp. t. 118.)—Glaucous. Panicle spreading. Spikelets ovate, of about three acute florets, connected by a web. Stipula very short and blunt.—Native of mountainous pastures in Westmoreland, Cumberland, and Anglesea, flowering in June. Root perennial, creeping, with villous fibres. Stem from four to six inches high. Whole plant glaucous. Florets ribbed, green at the base, purple and brown in the middle, white and membranous at the margin. Schrader, who directs us to strike out the synonyms of Willdenow, Haller, and Scheuchzer, quoted in Fl. Brit. (as belonging to his *supina*, Fl. Germ. v. 1. 289.) thinks the present plant differs from *pratensis* in its glaucous colour only. We agree that this is the chief distinction, but it seems to us essential. Hudson made our plant a variety of *pratensis*, but he mistook it for the Linnæan *alpina*, a widely different species.

*P. annua*. Annual Meadow-grass. Linn. Sp. Pl. 99. Willd. n. 16. Ait. n. 11. Curt. Lond. fasc. 1. t. 6. Mart. Rust. t. 98. Engl. Bot. t. 1141. Knapp. t. 52.—Panicle widely spreading. Spikelets ovate. Florets a little remote, five-ribbed, destitute of a web. Stem oblique, compressed.—Common every where in waste as well as cultivated ground throughout Europe, flowering at all times of the year when the weather is mild. In gardens it is a troublesome weed; in pastures it affords excellent food for cattle, and is rather improved than damaged by being trodden. Though the roots are annual, the lower part of the stems spread by numerous fibres, and thus the plant extends itself widely during summer, as well as by scattering abundance of seed. The herbage is bright green, not glaucous. Leaves flat, with a crumpled appearance here and there. Sheaths compressed, crowned with a sharp stipula. Spikelets ovate, variegated with green and white, rarely reddish. Florets a little silky at the back, membranous at the edge, destitute of a web at their base.

*P. glauca*. Slender Glaucous Meadow-grass. Fl. Dan. t. 964. With. 148. Sm. Fl. Brit. 1388. Engl. Bot. t. 1720. Ait. n. 19. (*P. casia*; Knapp. t. 56. P. n. 1468; Hall. Hist. v. 2. 224. *Festuca airoides*; Lamarck Dict. v. 2. 464, excluding the reference to Haller's n. 1439, which is *Festuca pumila* of Willd. Sp. Pl. v. 1. 420.)—Panicle glaucous, slender, erect. Spikelets ovate, of about three flowers. Glumes bluntish, silky-edged, unconnected by any web. Stipula very short.—Found on the loftiest mountains of Wales and Scotland; perennial, flowering in June. The whole plant is very glaucous, and of a much more slender habit than any of the foregoing, in which last character it approaches the following. Schrader indeed suspects it to be but a mountain variety of the *memoralis*. The spikelets however are more ovate and close, and we believe the glaucous colour to be an important distinction. If however the proximity of this, in other respects, to *memoralis*, and of our *humilis* to *pratensis*, should be thought to invalidate that character, we submit our opinion to the test of cultivation by seed, which alone can decide the question.

*P. nemoralis*. Wood Meadow-grass. Linn. Sp. Pl. 102. Willd.

Willd. n. 47. Ait. n. 20. Engl. Bot. t. 1265. Knapp. t. 58. Fl. Dan. t. 749. Hofst. Gram. Auflr. v. 2. 51. t. 71. —Panicle and leaves slender. Spikelets lanceolate, of about three flowers. Glumes acute, obsoletely five-ribbed. Stipula very short, notched.—This grass composes the tall thin herbage in woods or groves in the north of England, as well as rather mountainous woods throughout Europe. In lowlands it is less frequent, except on chalk. It is perennial, flowering in July and August. The whole plant is extremely slender, grass-green, one and a half, or two feet high. Stems smooth, flattish. Leaves rough to the touch, taper-pointed. Sheaths smooth, tight, compressed, shorter than the leaves. Stipula very short, notched, or torn. Panicle nearly erect, loose, capillary, zigzag, rough. Spikelets small, pale green, lanceolate rather than ovate. Glumes rough at the keel. Florets from two to four, shining, lanceolate, silky at their backs and hairy at the base, but not connected by a web.

There is a flouter variety, Hudson's *P. angustifolia*  $\alpha$ , the true *nemoralis* being his  $\beta$ .

*P. decumbens*. Decumbent Meadow-grass. Scop. Carn. v. 1. 69. With. 147. Sm. Fl. Brit. 107. Ait. n. 24. Schrad. Germ. v. 1. 305. Engl. Bot. t. 792. Knapp. t. 59. Hofst. Gram. Auflr. v. 2. 52. t. 72. (Festuca decumbens; Linn. Sp. Pl. 110. Willd. Sp. Pl. v. 1. 424. Fl. Dan. t. 162.)—Panicle nearly simple, condensed, erect. Spikelets ovate, of four florets, scarcely exceeding the calyx. Stipula bristly.—Native of spongy bogs, in barren sandy or mountainous situations, flowering in July. This species is perennial, of a remarkably harsh and rigid habit, lying close to the ground, except when in flower, and of no agricultural use. The roots creep moderately, and are very strong. Stems about a foot long. Leaves straight, tapering, acute, rather glaucous, with long hairy sheaths, and a bristly tuft of hairs in the place of the usual membranous stipula. Panicle zigzag, of a very few large purplish-glaucous flowers, of so ambiguous an appearance, that botanists have differed much about the genus of the grass in question; some making it a *Melica*, to which, as Linnæus remarks, it has a degree of affinity in habit as well as structure. Koeler esteems it a *Bromus*, and Bernhadi, like Decandolle, cuts the knot, by making it a new genus, we know not by what essential character. Mr. Brown is inclined to refer this puzzling plant to his own *Triodia*, Prodr. Nov. Holl. v. 1. 182.

The extra-european species of *Poa* afford a wide range for the botanist, too extensive for our present purpose. They require a more general investigation than they have yet received, though abundance of particular species have been described with sufficient care. Those of American growth agree best, as might be expected, with our's. Some tropical ones have so different an aspect, that it is to be wished they possessed some generic distinction. Many of them are singularly elegant when minutely examined. We apprehend that a great number still remain undescribed.

POA, in *Agriculture*, a genus of grasses, which principally forms the green covering of the fields: the meadow-grass.

There are several species, some of which are highly useful as field-grasses.

*Poa Angustifolia*, the narrow-leaved meadow-grass, which Mr. Sole says is a very sweet grass, especially for hay, but like the *trivialis*, is liable to go off after mowing. It is dispersed sparingly in the meadows about Hinton Abbey.

*Poa Annua*, the dwarf or white meadow, or Suffolk grass, which, according to Mr. Sole, is the quickest in growth of all the grasses, coming up, blooming, and ripen-

ing its seeds in the course of one month. It ought therefore to be called *mensual*; but as it will keep time with no other grass, it is not worth sowing. It is always leaving the ground bare in patches, except there happens to be an *agrostis* to fill its place. It is however a very sweet grass, and very generally liked by animals of most sorts.

*Poa Aquatica*, the reed meadow-grass, which, Mr. Sole says, is an excellent grass in its native soil, the fens of the isle of Ely, growing to the height of six feet. It is usually cut when about four feet in height, and when dry, is bound into sheaves; and it mostly undergoes a heat in the stack that improves its quality. It is found an excellent fodder for milch cows, but horses are not fond of it. In that place it is called *fodder* by way of eminence, other sorts of coarse hay being denominated *flower*, which signifies *coarse stuff*, and it is called *white lead*, from its drying of a white colour.

*Poa Bulbosa*, the bulbous meadow-grass, which Mr. Sole finds to have all the good qualities of the *pratensis*, in so far as its size will admit, and it is proper for hilly dry grounds and poor soils, where it delights to grow. It is found in the hilly dry pastures about Newton St. Loe.

*Poa Compressa*, the compressed, or flat stalked meadow-grass, which Mr. Sole thinks an excellent grass for parks and sheep-walks, as both deer and sheep are fond of it; and as it is a dwarf grass, the blades seldom exceeding two inches in height, it forms a fine turf, and causes the flesh of the animal to cut short, and be fine flavoured. It is found in blossom in some places about Claverdon Down, and probably on the down itself, but the sheep there never suffer a bent of it to blow.

*Poa Difflans*, the fen meadow-grass, which Mr. Sole finds an exceedingly sweet grass, affording very rich milk, but it is difficult to cultivate, as it delights in miry situations. It grows in most sea-marshes, and abundantly about Cottenham, and the fens of Cambridgehire.

*Poa Loliacea*, the hard or darnel meadow-grass, which Mr. Sole thinks the most insignificant of all the pois, but which has one good property, that of growing where no other grass is capable of living, as in the driest parching sea-fands.

*Poa Maritima*, the sea meadow-grass, which the same botanist considers as a fine nourishing grass, being the principal one of our best salt-marshes; but from its delighting in salt, is difficult of cultivation.

*Poa Palustris*, the marsh meadow-grass, which Mr. Sole thinks a fine exuberant grass, and probably the best dairy grass. It grows in the rich marshes in all parts of the island, particularly those that are frequently refreshed by the occasional overflowings of rivers. It is valuable for laying down spongy lands. It has often the height of four or five feet; and the panicle, when full blown, is extremely fine and flowing.

*Poa Pratensis*, the great or smooth-stalked meadow-grass, which, for the purposes of agriculture, is considered by Mr. Sole as the most noble of all the grasses. Its foliage begins to shoot and put on a fine verdure early in the spring, but not so soon as some other grasses. Every animal that eats grass is fond of it; while it makes the best hay, and affords the richest pasture. It abounds in the best meadows about Laycock and Chippenham, and it has the valuable quality of abiding in the same land, whilst most other grasses are continually changing. According to some, it delights in rather a dry than a moist soil and situation, on which account it keeps its verdure better than most others in dry seasons; but it thrives most luxuriantly in rich meadows. It has been objected to by some from its creeping roots, which are difficult to extirpate, of course it is probably the most suited

suit to permanent grass lands. According to Curtis it is distinguished from the rough-stalked meadow-grass, by the stem being smooth when drawn between the finger and thumb, and while in that the membrane at the base of the leaf is long pointed, in this it is short and blunt. And besides, it only throws up flowering stems once in the season, and is of course well suited for lawns, &c.

*POA Setacea*, the fine meadow-grass, which Mr. Sole considers as a fine rich grass for upland pastures, as it delights in a dry soil. It is found in the hilly pastures about Newton, in Somersetshire. It is likewise an abiding grass.

*POA Trivialis*, the common or rough-stalked meadow-grass, which Mr. Sole thinks a fine grass for hay as well as pastures, but inferior to the pratensis. It delights in moisture and sheltered situations, on which account it is tender though productive. In rich land it grows tall; its height however is about two feet. It is said by some to be well suited to good found moist loams. It is much esteemed on the continent for dry pastures and watered meadows, as it multiplies by seed as well as the root. It is of course proper to let the seeds fall. Its fattening property is considerable for cattle. It is, however, apt to go off after mowing, being overpowered by those grasses of the bent kind. Its radical leaves, as well as those on the stem, grow much larger than in the pratensis. In sowing it the seeds should be carefully separated.

**POAKE ROOT**, in Virginia, is used to denote the solanum bacciferum. The Indians use it for a purge, though commonly deemed a poison. Phil. Trans. N<sup>o</sup> 454. § 1.

**POBEDA, LA**, in *Geography*, a town of Spain, in Old Castile; 13 miles N. of Soria.

**POBETTEN**, a town of Prussia, in the province of Samland; 16 miles N.W. of Königsberg.

**POBIANITZA**, a town of the duchy of Warsaw; 33 miles E.N.E. of Siradia.

**POBINDEN**, a town of Prussia, in the province of Samland; 15 miles N. of Königsberg.

**POBLA, LA**, a town of Spain, in Catalonia; 25 miles N.W. of Salfoa.

**POBLA de Lillett**, a town of Spain, in Catalonia; 20 miles E.S.E. of Urgel.

**POBLACION**, a town of Spain, in Navarre; 12 miles W. of Estella.

**POBLEDA, LA**, a town of Spain, in Old Castile; 21 miles S.W. of Calahorra.

**POBNITZ**, a river of Bohemia, which rises near Culmbach, on the borders of Silesia, and runs into the Elbe, near Tetschen.

**POCAHONTAS**, a town of Chesterfield county, in Virginia, within the jurisdiction of Peterburg, in Dinwiddie county; probably deriving its name from the famous princess Pocahontas, the daughter of king Powhatan. Morse.

**POCAR**, a town of Naples, in Principato Citra; 7 miles W. of Salerno.

**POCATSJETTI, H. M.**, in *Botany*, the name of a small shrub which grows in Malabar. The leaves powdered and sprinkled upon ulcers, repress luxuriant and fungous flesh; and taken internally, they excite a sweat, and diminish the paroxysm of an intermitting fever.

Of the bark and root, powdered, and mixed with oil, an unguent is made, said to be good for the itch, and other cutaneous disorders.

**POCCOON**. See **PUECOON**.

**POCHARD**, in *Ornithology*, the name of a species of wild duck, called by some the *penelope* and *rotbals*, and by many in English the red-headed widgeon.

It is larger than the common widgeon, and is shorter and

thicker bodied. This is the *ANAS ferina* of Gmelin. See **DUCK**.

**POCHERRY**, in *Geography*, a town of Hindoostan, in Marawar; 5 miles S. of Ramanadporum.

**POCK**. See **POX**.

**POCK-WOOD**. See **GUAIACUM**.

**POCKESO**, in *Geography*, a populous and commercial town of Africa, in the district of Axim, on the Gold Coast.

**POCKET SHERIFFS**, in *Law*, sheriffs nominated of the sole authority of the crown. See **SHERIFF**.

**POCKET**, in *Rural Economy*, a large sort of bag, in which hops are packed up, in order to be sold; being formed of a particular kind or quality of facking. See **HOPS**.

**POCKET of Wool**, is half a sack. See **SACK of Wool**.

The pocket contains usually twenty-five hundred weight of wool.

**POCKET Instruments**, in *Surgery*, are such as a surgeon ought always to have in readiness, and may conveniently carry about him in a proper case: these are two lancets of different sizes; the one proper to open abscesses, the other smaller, for bleeding; a pair of straight scissars, useful on many occasions; a pair of crooked scissars, proper to be used in dividing fistulæ, and in several other cases; a pair of forceps, with teeth at one end, to remove dressings, and upon occasion to extract splinters or thorns: these are also serviceable to the surgeon in his anatomical exercises; they are commonly made of steel, but those of silver are much neater; a razor; a straight incision-knife; a crooked incision-knife; a straight double-edged incision-knife; a probe with one end broad and thin, proper for discovering a fissure in the cranium, and for many other uses; and the other end rounded, to examine the depth and situation of wounds and ulcers. The neatest probes are made of silver, though they are frequently made also of steel, ivory, or whalebone; a grooved probe or director, to direct the edge of the knife or scissars in opening sinuses, or fistulæ, that by this means the subjacent vessels, nerves, and tendons, may remain unhurt. The upper end of this instrument sometimes is ornamented, and serves only for a handle; sometimes it is made in form of a spoon, to contain powder to sprinkle upon wounds or ulcers; sometimes also this is made forked at the end, to divide the frænum of the tongue; a spatula to depress the tongue, in order to examine the state of the tonsils, uvula, and fauces, when they are affected with any disorders; it is also used to suspend the tongue when the frænum is to be divided; for which purpose it is to be made with a fissure at its extremity, and should therefore rather be made of silver than of any other metal. Besides these, there should be an ordinary spatula for spreading plasters, ointments, and cataplasms; and sometimes, by means of their sulcated extremity, they are of service in raising up fractured bones of the cranium; several needles must also be kept here, some straight and others crooked, for the stitching up of wounds, taking up of arteries, and many other uses. Heister's Surg. p. 12.

**POCKET Medicines**. See **MEDICINE**.

**POCKLINGTON**, in *Geography*, is a market town and parish, situated partly within the liberty of St. Peter, York, and partly in Wilton-Beacon division, in the wapentake of Harthill, East Riding of Yorkshire. The town is distant from York 13 miles E. by S., and from London 197 N. by W. The market-day is Saturday every week, and there are four fairs annually. Here are held the petty sessions for Wilton-Beacon division of the wapentake of Harthill. The living is a vicarage in the patronage of the dean of York. According to the parliamentary returns of 1811, the houses

houses in this town were estimated at 396, and the inhabitants at 1539 in number.

Several places in the vicinity of Pocklington merit the notice of the topographer and antiquary. The Roman road, called the Ermine-street, passes within two miles to the west of the town. Londesborough-park, which it intersects at the distance of three miles, is supposed by Drake, the historian of Yorkshire, to be the ancient Delgovitia, but the circumstances upon which he founds his opinion are by no means conclusive. This place was for many centuries a feat of the ancient and celebrated family of the Cliffords. It is now the property of the duke of Devonshire, as descendant from the daughter and heiress of Henry Clifford, the fifth and last earl of Cumberland. The house is situated on elevated ground, and is surrounded by an extensive and well wooded park. At Melburn, five miles to the south-west of Pocklington, is the feat of sir Henry Vafavour, bart. The mansion is a large modern edifice of brick, and commands some fine views of the western acclivities of the wolds. Stamford-bridge, eight miles to the north-west, Drake conceives to be the scite of the Derventio, but Camden fixes that station at Aldby, about a mile and a half to the northward. Here was fought, in 1066, one of the most bloody battles recorded in the history of England, between the forces of Harold II. and those of Tofti his brother, the banished earl of Northumberland, assisted by Harfagar, king of Norway. The contest lasted from seven in the morning till three in the afternoon, when the Norwegians and rebels were routed with immense slaughter. Beauties of England and Wales, vol. xvi. by John Bigland.

POCKREKESKO, a river of North America, in New-Britain.

POCO ALLEGRO, in the *Italian Music*, is not so fast as allegro.

Poco *Largo*, intimates to play or sing a little slow. See **LARGO**.

Poco *meno Allegro*, is used to signify that the part it is joined to should be played or sung in a little less gay manner than allegro requires.

Poco *Presto*, serves to let us know that we ought to sing or play that part to which it is annexed, not quite so quick as presto requires it should.

POCOCK'S ISLAND, in *Geography*, an island in the East Indian sea, S. lat. 6° 2'. E. long. 118° 12'.

POCOCKE, EDWARD, in *Biography*, a celebrated orientalist, was born at Oxford in 1604: he received the early part of his education at the free school of Tame, and in 1618 was entered a commoner of Magdalen Hall, Oxford. In 1620 he removed to Corpus Christi college, in which he obtained a scholarship. He now began to apply himself to the study of the oriental languages, and the ardour which he manifested in the pursuit, caused him to make extraordinary progress in a comparatively short time. In 1627 he began to prepare, from a MS. in the Bodleian library, a Syriac version of four epistles, which were yet wanting to a complete translation of the New Testament into that language. This work he finished in 1628, and in the same year he was admitted probationary fellow of his college; and the epistles coming to the knowledge of Gerard John Vossius, he carried them to Leyden, where they were printed under the inspection of Lewis de Dieu. Pococke was ordained priest in that year; and having been appointed chaplain to the English factory in Aleppo, he arrived at that city in 1630. He instantly took advantage of the situation; engaged a master in the Arabic tongue, and a servant of the nation for the purpose of familiar converse in it. As a still surer guide, he undertook the translations of several

Arabic books, among which was a collection of 6000 proverbs. Having received a commission from the famous Dr. Laud, bishop of London, for the purchase of Greek coins, and Greek and Oriental MSS., he was eager in obtaining them; though more than once the zeal which he shewed for his employer exposed him to imminent danger from the plague. In 1636 he was nominated by the bishop first professor of the Arabic lecture founded by that munificent prelate at Oxford. He accordingly returned to take possession, and in August of the same year he opened his lectures with an eloquent Latin oration, on the nature and use of the Arabic tongue. Having commenced his official duties, he obtained leave of absence to embark with a learned mathematician, in 1637, for Constantinople. Here he staid till 1640, and passing through Paris on his return, he had an interview with the illustrious Grotius, who was much gratified on being consulted by him on the Arabic translation of his celebrated work, "De veritate Christianæ Religionis."

On his arrival in England, he had the mortification and misery to find his patron, bishop Laud, a prisoner in the Tower. In 1643 he was presented by his college to the rectory of Childrey, in Berkshire, and he immediately set himself to perform the functions of a parish priest, with all the modesty and simplicity of his character. In the following year, the salary of his professorship being seized by the sequestrators as part of the archbishop's estate, Pococke was reduced to his country living. He thought it now suitable to his situation to marry, and in 1646 he formed an union with the daughter of Thomas Burdett, esq. of Hampshire. Soon after this, by the interest of the learned Selden, he obtained the restoration of his salary, and was at the same time completely protected from the violences of the soldiery. In 1648, the Hebrew professorship at Oxford, with the prebend of Christ-church annexed, was given to him; but as he steadily refused to subscribe the engagement, he was not deemed eligible. Attempts were made to deprive him of his prebend and both his professorships; the former he actually lost, but by the intercession of powerful friends, he was allowed to retain the latter. In 1650 he published his "Specimen Historiæ Arabum," and in 1652 he engaged to afford his assistance to the editors of the Polyglott Bible, his task being the collation of the Arabic pentateuch. In 1654 he was in danger of being ejected from his living on account of ignorance and insufficiency; at least those were the charges preferred against him by Cromwell's committee. Some of his Oxford friends, however, particularly Dr. John Owen, so warmly represented the disgrace which would follow the rejection upon such grounds, of a man more eminent than almost any other in Europe for sound learning, that the prosecution was abandoned. In 1655 he published "Porta Mosis," being six prefatory discourses of Moses Maimonides, containing an account of the Jewish doctrine and discipline. Mr. Pococke added a Latin version, with a large appendix of miscellaneous notes, and this was the first specimen of the Hebrew press at Oxford. In 1659 he published, according to his promise made to Selden, the annals of the patriarch Eutychius, in Arabic and Latin, with Selden's preface and notes. On the restoration of Charles II. he obtained the restitution of his prebend and canonry of Christ-church, and in that year, 1660, he took his degree of D.D. He had the mortification to find, that in the new reign oriental literature fell into discouragement, nevertheless he continued through life to perform the duties of his professorships. His other publications after this were "Carmen Abu Ismaelis Togræi," Arab. et Lat.: "Gregorii Abul Farajii Historia Dynastarum," Arab. et Lat.: "Commentaries upon Micah, Malachi, Hosea, and Joel;" in these he is a defender of the purity of

of the Hebrew text against the objections of several learned men, and he takes great pains to set in a strong light the predictions of the Old Testament, generally supposed by Christians to relate to Jesus Christ. The last of these he published in 1691; and if he intended, which is not certain, to pursue the same plan with the other minor prophets, he was prevented therein by his death, which happened on the 10th of September, in that year, being in the 87th year of his age. A gradual diminution of strength and bodily vigour had for some time, previously to this, indicated his approaching dissolution, but his intellects and memory were continued almost unimpaired to the last. His body was interred in the cathedral of Christ-church, and on the north wall there is a monument, with an inscription, from which the following is an extract, "Edwardus Pococke, S.T.D. cujus nomen audias, nihil hic defama desideres." To the excellence of his private character, Mr. Locke bears the most ample testimony. He represents him as free, open, and intelligent in his conversation; sincere, modest, humble, and tranquil, singularly charitable, and forgetful of injuries. He adds, "his life appeared to me one constant calm. To conclude, I can say of him what few men can say of any friend of theirs, nor I of any other of my acquaintance; that I do not remember I ever once saw in him one action, that I did, or could in my own mind blame, or thought amiss in him."

As a scholar, his knowledge of language comprised all the principal oriental tongues, with some European, besides the Latin and Greek. He was father of a numerous family, of whom the eldest son, Edward Pococke, published under his father's direction, in 1671, an Arabic work, with a Latin version, entitled "Philosophus Autodidactus, five Epistola Abu Jaafir Ebn Tophail de Hai Ebn Yokdhan." The design of the author Abu Jaafir Abn Tophail, who was a Mahometan philosopher, is to shew, by an ingenious fiction, how human reason, by observation and experience, without any assistance, may arrive at the knowledge of natural things, and from thence rise to supernatural, particularly to God and a future state. For this purpose he supposes a person, Hai Ebn Yokdhan, brought up by himself, where he was altogether destitute of instruction, but what he could get from his own observations. Mr. Pococke had also prepared an Arabic history, with a Latin version, and actually sent it to the press; but this performance, not being worked off when his father died, was withdrawn by him upon a disgust at his being disappointed of succeeding him in the Hebrew professorship. *Biog. Brit.*

POCOCKE, RICHARD, a distinguished traveller, and a prelate of the Irish church, son of a clergyman of Southampton, was born in 1704. He was educated at his native place, whence he was removed to Corpus-Christi college, in Oxford. In 1731 he took the degree of bachelor of laws, and in 1733 that of doctor. About this time he made a tour on the continent, probably as tutor to some young man of rank. In 1736 he made a second tour, in which he took his course through Holland, Germany, Hungary, and Italy, to Leghorn. In 1737 he embarked for Egypt, in which country he pursued his travels till the following spring. In the month of March, 1738, he embarked at Damietta for Palestine, and then took his road through Syria, Mesopotamia, Cyprus, Candia, and Lesser Asia, to Constantinople. He returned by sea from Cephalonia to Messina, whence, through Italy, Germany, and Flanders, he proceeded homewards. He returned in 1741, having been absent five years. The results of his observations and researches were given to the public, under the title of "Description of the East, and some other Countries," of which the first volume, entitled "Observations on Egypt," dedicated to Henry, earl of

Pembroke and Montgomery, appeared at London in 1743; and the second, entitled "Observations on Palestine, Syria, Mesopotamia, Cyprus, and Candia," dedicated to Philip, earl of Chesterfield, in 1745. These publications were well received: his remarks chiefly relate to buildings, inscriptions, and other remains of antiquity, but he has likewise many observations respecting manners and customs, and the products of nature and art, in the countries which he visited.

When the earl of Chesterfield was appointed lord-lieutenant of Ireland, in 1745, he carried Dr. Pococke with him as one of his domestic chaplains, and he soon appointed him archdeacon of Dublin. In 1756, the duke of Devonshire, then lord-lieutenant, promoted him to the bishopric of Ossory. He was translated to Meath in 1765, in which he died. Dr. Pococke, besides being an Oriental traveller, made a tour in Scotland, and gave a description of the basaltic rock in the harbour of Dunbar, resembling the Giant's causeway, which was printed in the *Philos. Transf.* vol. 32; also of some antiquities found in Ireland, printed in the second vol. of the *Archæologia*, vol. ii. Several MSS. which he presented to the British Museum, are preserved in that repository. Pococke's Travels.

POCOGNACA, in *Geography*, a town of Italy, in the department of the Mincio; four miles N. of Mantua.

POCOKOLIGO, a village of South Carolina; 15 miles from Combacee ferry, and 67 from Charleston.

POCOMOCK, a river of the state of Maryland, which discharges itself into the Chesapeake bay, forming a large bay at its mouth, called "Pocomock bay." N. lat. 37° 50'. W. long. 75° 50'.

POCONA, a town of Peru; 60 miles S. of Cuzco.

POCUMMA, in *Botany*, a name given by the people of Guinea to a species of plant which they use as an astringent. Their manner of taking it is very singular; for they put the leaves among their dough, and bake them into a mass with the bread, and then eat the whole together in their food. *Phil. Transf.* N° 232.

POCUTIA, or POKUCIA, in *Geography*, a province of Poland, annexed to Aultria, and included in the kingdom of Galicia.

POD, in *Botany* and *Vegetable Physiology*, has been considered as synonymous with the Latin *legumen*, as well as with *siliqua*; but it is now restricted to the latter, *legume* being used for the former. See *LEGUME* and *SILYUA*.

PODAGRA, ποδαγρα, thus called from πο, *foot*, and αγρα, *capture, seizure*, in *Medicine*, the gout in the feet.

PODAGRA *Dentium*, sometimes, though with impropriety enough, is used for the tooth-ach.

PODAGRA *Lini*, in *Botany*, a name given by some of the later Greek writers to cuscuta, or dodder, when found growing on the linum of flax. The Latins have called this *epithimum*, as they do the dodder growing on thyme *epithimum*; the earlier Greeks called this *linozotes*. Where this dodder takes root in a field of flax, it generally occupies many plants; and where it twines round them it causes protuberances and swelling, and has therefore been resembled to the gout on that plant.

PODAGRARIA, a name given by many authors to the lesser wild angelica, called also *herba Gerardis*.

PODALA, in *Geography*, a town of Hindoostan, in the Carnatic; 18 miles W. of Ongole.

PODALIRIUS, in *Biography*, an illustrious physician, and reputed son of Æsculapius, is celebrated by Homer as having accompanied the Grecian army in the Trojan war, together with his brother Machaon. He appears to have been the younger brother, and to have been on the whole less distinguished

distinguished than Machaon; though, like him, he was married to the daughter of a king. On his return from the siege of Troy, he was shipwrecked on the coast of Caria, where he was hospitably received by a shepherd, who, having learned that he was a physician, took him to king Damæthus, whose daughter had accidentally fallen from the top of a house. Podalirius bled her in both arms, after which she recovered, which so delighted the king, that he gave him his daughter in marriage, with the Cherfones as a portion. Here Podalirius built two cities, the one of which he called Syrnium, from his wife, Syrna, and the other Bybassus, which was the name of the shepherd who had received him when shipwrecked. Among other children, he had a son, called Hippolochus, from whom, in a direct line, Hippocrates considered himself as descended. See Le Clerc. Hist. de la Médecine, p. i. chap. 18. See MACHAON.

PODALYRIA, in Botany, a well-sounding name, which seems its chief recommendation; for we do not perceive what title the brother of Machaon, however famous a physician, has to botanical honours. The etymology of the original seems to be *πυδάλυριος*, lily-footed. The Hindoos at this day use *lotus-footed* as a compliment.—Lamarck Illustr. t. 327. f. 3, 4. Willd. Sp. Pl. v. 2. 501. Ait. Hort. Kew. v. 3. 6.—Class and order, *Decandria Monogynia*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, short, bell-shaped, in five unequal segments; its base externally concave. *Cor.* papilionaceous, of five petals. Standard twice as large as the rest, kidney-shaped, with a thick claw. Wings two, shorter than the standard, half-obovate, converging at their upper edges. Keel shorter than the wings, and covered by them, of two oblong converging petals. *Stam.* Filaments ten, awl-shaped, ascending, equal, inserted into the base of the calyx, permanent, cohering at the bottom; anthers roundish, small. *Pist.* Germen sessile, ovate; style longer than the stamens, ascending; stigma simple, obtuse. *Peric.* Legume ovate, turgid, coriaceous, of one cell. *Seeds* several, kidney-shaped.

Ess. Ch. Calyx in five unequal segments; hollow externally at the base. Corolla papilionaceous; the standard largest. Stamens permanent, combined at the base. Legume inflated, with many seeds.

This genus is limited by Mr. Salisbury and Mr. Brown to the simple-leaved species of Lamarck and Willdenow, to which only the above characters apply. They are shrubs, natives of the Cape of Good Hope, with a very silky habit, and confounded by Linnæus and Thunberg under *Sophora*. The ternate-leaved species of Lamarck and Willdenow compose the *Baptisia* of Ventenat, and Hort. Kew.; for those with pinnate foliage, see VIRGILIA.

1. *P. myrtilifolia*. Bilberry-leaved Podalyria. Willd. n. 13. Ait. n. 1. (*Genista arboreſcens africana*, styracis folio, flore cæruleo; Herm. Lugd.-Bat. 270. t. 271.)—"Leaves oblong-obovate, silky on both sides. Calyx silky. Stalks single-flowered, nearly as long as the leaves."—A greenhouse plant, flowering from April to July, introduced at Kew in 1795, but cultivated at Leyden more than a century earlier. Hermann says it grows at the Cape, in watery places. The stem is bushy, with hoary branches. Leaves numerous, alternate, coriaceous, rather pointed, clothed on both sides with white silky down. Flowers axillary, generally solitary, blueish. The specific name is not happy.

2. *P. fericea*. Silky Podalyria. Ait. n. 2. (*Sophora fericea*; Andr. Repof. t. 440.)—"Leaves oblong-obovate, silky on both sides. Calyx silky. Stalks single-flowered, many times shorter than the leaves."—Found at the Cape

by Mr. David Nelson, and introduced into Kew garden in 1778. It flowers from August to November, but rarely. This has more considerable recurved points to the leaves, and pale purplish flowers, supported by short, simple, solitary, axillary stalks. The legume is an inch long, very silky, like every other part, except the corolla.

3. *P. biflora*. Two-flowered Podalyria. Lamarck f. 3. Willd. n. 12. Ait. n. 3. Curt. Mag. t. 753. (*P. argentea*; Salif. Parad. t. 7.)—Leaves oval, pointed, silky on both sides. Calyx clothed with dense rigid down. Stalks two-flowered, much longer than the leaves.—Native of the same country. Mr. Masson sent it to Kew in 1789. It flowers in May and June, and occasionally at other seasons. The leaves are rather less decidedly obovate than in the two former. Flower-stalks stout, twice or thrice as long as the leaves, each bearing two, rarely three, large, handsome, sweet-scented, white or pale purplish flowers, whose calyx is of a rusty hue, rough with rigid short down, that is most dense in the wild specimens. Linnæus doubtless comprehended this plant under his *Sophora biflora*, but he confounded with it two or three others, so that he cannot, with precision, be quoted for any.

4. *P. calyptрата*. Reticulated Podalyria. Willd. n. 11. Ait. n. 4. (*Sophora calyptрата*; Retz. Obs. fasc. 1. 36. *Crotalaria*; Seb. Mus. v. 2. t. 99. f. 3, good. Willd.)—Leaves somewhat obovate, reticulated beneath; downy when young. Stalks single-flowered, about equal to the leaves. Calyx villous; its limb membranous, reflexed.—From the same country; sent to Kew in 1792. It flowers during summer. The smoothness of the adult leaves, and their strong copious reticulations beneath, mark this species at first sight. The stalks, shorter than the last, bear but one flower, accompanied, as in the rest, by a deciduous bractea. Corolla purplish.

5. *P. hirsuta*. Hairy Podalyria. Willd. n. 14. Ait. n. 5. (*P. styracifolia*; Sims in Curt. Mag. t. 1580?)—"Leaves villous, stalked; the upper ones ovate; the lower roundish. Stalks single-flowered. Calyx villous; its segments the length of the wings."—Sent by Mr. Masson from the Cape, in 1774. The flowers are more copious than in any of the former, but not of frequent occurrence. Leaves in our wild specimen nearly orbicular; the adult ones almost smooth above. Flower-stalks about the length of the leaves. Corolla pink, large and handsome. The foliage in the Botanical Magazine is drawn more ovate than we have seen it, but answers the better to Mr. Brown's specific character given above, and we are therefore more inclined to refer Dr. Sims's plant to the present than to the last species. He speaks of it as a beautiful shrub, requiring an airy greenhouse, propagated by cuttings, and blooming from May to July. No wonder that it has passed unexamined, under the name of *biflora*, as it so rarely produces flowers. Linnæus applied that name to a specimen of this, pasted with one of the *calyptрата*, on the same paper.

6. *P. buxifolia*. Box-leaved Podalyria. Willd. n. 15. (*Podalyria*; Lamarck f. 4. *Sophora buxifolia*; Retz. Obs. fasc. 1. 35. *S. pedunculata*; Thunb. Prodr. 79.)—Leaves elliptic-obovate; smooth above; silky beneath. Stalks single-flowered, longer than the leaves. Calyx downy, coloured, acute.—Native of the Cape, but not yet known in our greenhouses. We have seen no specimen. The leaves are represented about the size and shape of Box, scarcely half, or one-third, the length of the flower-stalks; but Retzius describes the latter as no longer than the leaves. The calyx is hairy within, as well as without; its segments acute. Corolla purplish, with paler wings.

7. *P. cordata*. Heart-leaved Podalyria. Ait. n. 6. (5 E (*Sophora*

(*Sophora cordata*; Thunb. Prodr. 79? *Brown*.)—"Leaves heart-shaped, roundish, nearly sessile, extremely villous. Stalks two-flowered. Calyx villous, its segments shorter than the wings. Sent by Mr. Mallon from the Cape to Kew, in 1794. It flowers there from May to July. We have seen neither specimen nor figure. Willdenow omitted Thunberg's plant, because the character was not sufficient to satisfy him respecting it.

Lamarck represents, at his fig. 5, another supposed species; a small shrub, with inversely heart-shaped leaves, and solitary, nearly sessile, flowers; the legume small, ovate, hairy, single-seeded. This seems unnoticed by any subsequent writer, nor are we acquainted with the plant.

PODANA, in *Geography*, a town of Hindoostan, in the circle of Condapilly; eight miles from Masulipatam.

PODANG-MEW, a large and populous city of the Birman empire, not far from the city of Prome.

PODARIA, in the *History of Insects*, a classical name comprehending all such insects as have limbs, but no wings. Hill. See *APTERA*.

Of this class there are two subdivisions. 1. Such *aptera podaria* as have oblong bodies with numerous legs, or more than six pair: these are the julus, or gally-worm; the scolopendra, or centipes; and the oniscus, or wood-louse. 2. The *aptera podaria* with shorter bodies, and less numerous legs, or fewer than six pair. This subdivision contains numerous genera, as the pulex; the podura or puceron, the pediculi of various kinds, the monoculi, the acari, the aranei, the scorpio, and a great many others. See *GALLY-WORM*, *SCOLOPENDRA*, &c.

PODEM, in *Geography*, a town of Asiatic Turkey, in the government of Trebizond; 30 miles E. of Trebizond.

PODEMNO, a town of Russia, in the government of Tobolsk; 44 miles E. of Kemikoi.

PODENDA, a town of Asiatic Turkey, in Aladulia, at the confluence of Seihoun with the Adana; 33 miles N. of Adana.

PODENSEE, a town of France, in the department of the Gironde, and chief place of a canton, in the district of Bourdeaux; five miles N.W. of Cadillac. The place contains 1425, and the canton 15,688 inhabitants, on a territory of 250 kilometres, in 13 communes.

PODENSEE, a town of Austria; eight miles W. of Tulin.

PODENTES, a town of Portugal, in the province of Beira; 10 miles N.E. of Coimbra.

PODENZANA, a town of the duchy of Piacenza or Placentia; five miles S. of Piacenza.

PODERADOS, in *Ancient Geography*, an episcopal town of Phœnicia, the episcopate being dependent on Thebus, the second metropolis of the patriarchate of Antioch.

PODERIS, *ποδρίς*, from *πῶς*, *pes*, and *ἀγῶ*, *apto*, in *Antiquity*, a robe hanging down to the feet; but it is chiefly used to express a linen garment, a surplice, a skirt. The Jewish priests were covered with this kind of long surplices during the time of their attendance in the temple; and this was the proper habit of their order.

PODESTA, or *POTESTA*, a magistrate, or officer of justice and policy, in a free city.

The name is originally Italian, *podesta*; and is chiefly applied to certain magistrates of Venice and Genoa, whose function is to administer justice in those republics.

The *podesta* in Venice corresponds to the praetor in ancient Rome, though appeals he from his decisions to the new auditors, or the new civil quaranty. See *QUARANTIA*.

PODESTANA, in *Geography*, a town of Italy, in the Veronese; 15 miles N. of Verona.

PODETIUM, in *Botany*, from *πῶς*, a foot, a name appropriated by Acharius to the peculiar footstalk of the tubercles in the cup lichens. See *LICHENES*.

PODEX, in *Anatomy*, &c. the same with anus, or fundament.

PODGINOCK, in *Geography*, a town of Russia, in the province of Ustling; 100 miles E.S.E. of Ust Sifolsk.

PODGORODKOI, a fort of Russia, in the government of Upha, on the Ural; 92 miles E. of Orenburg.

PODGURZA, a town of the duchy of Warsaw, on the Vistula, opposite to Thorn.

PODHORSAN, a town of Bohemia, in the circle of Saatz; eight miles S.S.W. of Saatz. N. lat. 50° 12'. E. long. 13° 29'.

PODICEPS, in *Ornithology*, a name given by many to the several kinds of *colymbi*, or divers, as they are also called in English *arse-feet*; from their legs being placed very backward on their bodies, by which means they have great advantages in swimming and diving. See *COLYMBUS Podiceps*.

PODIEBRAD, in *Geography*, a town of Bohemia, in the circle of Koniggratz; 14 miles S.E. of Biezow.

PODISMUS, *ποδισμός*, among the Greeks, a certain space or number of feet laid out by surveyors; it was the same with what the Romans call *pedatura*.

PODIUM, in the *Theatre of the Ancients*, the wall that separated the orchestra from the scene. Mem. de l'Acad. vol. i. p. 190.

PODKAMIEN, in *Geography*, a town of Austrian Poland, in Galicia; 56 miles E. of Lemberg.

PODKAMNEN, a town of Russia, in the government of Tobolsk, on the Tchulim; 32 miles N. of Atchink.

PODLACHIA, a county or palatinate of Poland; bounded on the N. by Prussia and Lithuania, on the E. by Lithuania, on the S. by the palatinate of Lublin, and on the W. by Masovia; annexed by the conquest of Poland in 1596. It is also called the "Palatinate of Bielsk," from its capital.

PODMASCHESCHNAIA, a town of Russia, in the government of Archangel; 48 miles S.W. of Mezen.

PODOK, a town of Poland, in the palatinate of Braclaw; 30 miles N.W. of Braclaw.

PODOL, a town of Bohemia, in the circle of Chrudim; five miles W.S.W. of Chrudin.

PODOLLEPIS, in *Botany*, aptly so named by Labillardiere, from *πῶς*, a foot, and *λεπίς*, a scale, in allusion to the numerous scales, which clothe the flower-stalks.—Labill. Nov. Holl. v. 2. 56. Brown in Ait. Hort. Kew. v. 5. 82. (Scalia; Sims in Curt. Mag. v. 24. 956; a name adopted from Theophrastus, whose *πυξίς* appears to belong to the same tribe.)—Class and order, *Syngenesia Polygama superflua*. Nat. Ord. *Compositæ capitatae*, Linn. *Corymbiferae*, Juss.

Gen. Ch. *Common Calyx* hemispherical, imbricated, with numerous stalked membranous scales. *Cor.* compound, radiated. Florets of the disk numerous, tubular, all perfect, with five equal spreading segments; those of the radius female, ligulate, with from two to four oblong segments. *Stam.* Filaments, in the florets of the disk only, five, capillary; anthers united into a rather prominent tube. *Pistl.* in all the florets, German inferior, obovate; style cylindrical, scarcely so long as the stamens; stigmas two, bluntish, spreading. *Peric.* none, except the permanent calyx. *Seeds* solitary, oblong, compressed. *Down* sessile, capillary, roughish. *Recept.* naked, dotted.

Ess. Ch. Receptacle naked. Down simple. Calyx hemispherical, imbricated, with stalked membranous scales.

1. *P. rugata*. Wrinkle-scaled Podolepis. Labill. Nov. Holl. v. 2. 57. t. 208. Ait. n. 1.—Scales of the calyx rugged, obtuse.—Native of the south-west coast of New Holland. Sent to Kew by Mr. Peter Good, in 1803. It requires the shelter of a greenhouse in winter, and flowers in July and August. *Root* perennial. *Stem* herbaceous, either quite simple, or a little branched at the top only, about a foot high, minutely downy. *Leaves* linear, acute, entire; the lower ones somewhat lanceolate. *Flowers* few, on long, terminal, simple, scaly stalks. Their *disk* is about an inch wide; the *radius* short. *Calyx* of a tawny or rusty hue, shining, chaffy; the outermost scales spatulate.

2. *P. acuminata*. Sharp-scaled Podolepis. Ait. n. 2. (*Scalia jaceoides*; Curt. Mag. t. 956.)—Scales of the calyx even, sharp-pointed. Gathered in New South Wales by Mr. Brown, and sent to Kew by Colonel Paterfon, in 1803. It is a hardy greenhouse plant, flowering all through the summer, and differs from the former chiefly in having a larger *flower*, the *radius* being considerably longer, as well as in the sharpness of the *calyx-scales*. All the *florets* are of a golden yellow.

PODOLIA, in *Geography*, a province of Poland, bounded on the N. by Volhynia, on the E. by the palatinate of Kiev, on the S. by Moldavia, and on the W. by the palatinate of Lemberg, near the kingdom of Galicia. The country is fertile, but exposed to the plunder of barbarous nations, by which it has been cruelly ravaged. It abounds with a fine breed of horses and horned cattle. The inhabitants are warlike, and were formerly governed by their own dukes or sovereigns. In the fifteenth-century it was the object of violent contests between the Lithuanians and Poles; but by the decree of a diet held at Lublin in 1569, it was annexed to Poland. Podolia consists of two palatinates, that of Podolia and that of Braclaw; both of which are annexed to Russia, except a small part towards the W., including Tarnopol, and a few more towns.

PODOLICZ, a town of Hungary, on the river Poprat; 12 miles S.W. of Palotza.

PODOLOBIUM, in *Botany*, from *παις*, a foot, and *λοβος*, a pod or legume, because that part is elevated on a footstalk. Brown in Ait. Hort. Kew. v. 3. 9. Sims in Curt. Mag. v. 36. 1477. — Class and order, *Decandria Monogynia*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminosæ*, Juss.

This genus is comprehended under *Chorozema*, by the writer of the present article, in Tr. of the Linn. Soc. v. 9. 251, nor does he perceive a character by which they can well be separated, though Dr. Sims and Mr. Brown have thought otherwise. The keel in *Podolobium* is rather longer than the wings; in *Chorozema* shorter. The *leaves* are indeed opposite in *P. trilobatum*, Curt. Mag. t. 1477, but this does not appear to be the case with every species, nor is it very precisely or constantly so, even with the plant in question.

PODOLSK, in *Geography*, a town of Russia, in the government of Moscow; 28 miles S. of Moscow. N. lat. 53° 16'. E. long. 37° 29'.

PODOLYB, a town of Bohemia, in the circle of Koniggratz; 12 miles W.N.W. of Koniggratz.

PODOMETER, for PEDOMETER. See PEDOMETER.

PODONIPTÆ, formed from *παις*, ποδος, foot, and *νιπτω*, I wash, in *Ecclesiastical History*, a name given to some of the rigid Anabaptists, who enjoin it as an obligation upon the members of their community to wash one another's feet, in compliance with the example of Christ.

PODOPERURA, in *Ancient Geography*, a town of India, on this side of the Ganges, in the country of the people called Limyricæ. Ptolemy.

PODOPHYLLUM, in *Botany*, from *παις*, a foot, and *φυλλον*, a leaf. Tournefort originally called it *Anapodophyllum*, from *anas*, the Latin name for a duck; thus composing a hybrid word, unworthy of his taste and scholarship. De Theis erroneously lays the blame on Catesby. The idea of this appellation arose from a vague resemblance in the leaves, to the webbed feet of many aquatic birds, which is sufficiently intelligible in the word as Linnæus has pruned it.—Linn. Gen. 262. Schreb. 349. Willd. Sp. Pl. v. 2. 1141. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 3. 287. Pursh. v. 2. 366. Juss. 235. Lamarck Illustr. t. 449. (*Anapodophyllum*; Tourn. t. 122.)—Class and order, *Polyandria Monogynia*. Nat. Ord. *Rhocadeæ*, Linn. *Ranunculaceæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of three large, coloured, ovate, concave, ascending leaves, soon falling. *Cor.* Petals nine, orbicular, concave, plaited at the margin. *Stam.* Filaments numerous, very short; anthers oblong, large, erect. *Pist.* Germen superior, roundish; style none; stigma obtuse, furrowed. *Peric.* Berry globose, crowned with the permanent stigma, of one cell. *Seeds* numerous, roundish. *Receptacle* central, unconnected.

Ess. Ch. Corolla of nine petals. Calyx of three leaves, deciduous. Berry of one cell, crowned with the stigma.

1. *P. peltatum*. Duck's-foot, or May-apple. Linn. Sp. Pl. 723. Willd. n. 1. Ait. n. 1. Trew Ehret, t. 29. (*Anapodophyllum canadense*; Catesb. Car. v. 1. t. 24. *Aconitifolia humilis*, flore albo unico campanulato, fructu cynosbati; Mentz. Pugill. t. 11.)—Native of North America, from New England to Carolina, in shady woods, generally where the ground is moist, growing in large patches, and flowering in March and April. The fruit is the size of a common plum, green, eatable, known by the name of May-apple: the root is sometimes used as Ipecacuanha. *Pursh.* This is a hardy perennial herbaceous plant, known time out of mind in our more curious gardens. The *root* creeps, and resembles that of the *Helleborus niger*. *Stems* solitary, simple, round, smooth, about a foot high, crowned with two large, stalked, peltate, lobed, and jagged, smooth *leaves*, between whose *footstalks* grows a solitary, stalked, drooping white *flower*, an inch and a half broad, whose *petals* are curiously reticulated with veins.

The other species of Linnæus, *P. diphyllum*, Sp. Pl. 723, is separated from this genus by Barton, Michaux, and Pursh, and is thus distinguished.

Calyx of five leaves, deciduous. Petals eight, incurved. Capsule obovate, somewhat stalked, of one cell, bursting below the summit. Seeds several, oblong, tunicated at the base.—This has received the name of *Jeffersonia diphylla*. It belongs to *Octandria Monogynia*, and appears to us a tolerably distinct genus, though retained in *Podophyllum* by Willdenow, and consequently in Hort. Kew. See Pursh v. 1. 268.

PODOR, in *Geography*, a fortress of Africa, on the Senegal, built by the French, and ceded to the English in 1763; afterwards retaken by the French, and kept by them in the peace of 1783. N. lat. 17° 1'. W. long. 14° 20'.

PODOSTEMUM, in *Botany*, derived from *πους*, a foot, and *στημων*, a stamen; so named by Michaux on account of the stamens being situated on a base or foot, which is divided into two branches.—Michaux Boreal-Amer. v. 2. 164. Willd. Sp. Pl. v. 4. 196. Pursh. v. 1. 3.—Class and order, *Monœcia Diandria*. Nat. Ord. . . . .

Gen. Ch. Male, *Cal.* Perianth none. *Cor.* none. *Stam.* Filaments two, capillary, connected at the base by a common footstalk; anthers somewhat heart-shaped, two-celled.

Female, *Czl.* Perianth none. *Cor.* none. *Pist.* Germen sessile, ovate, with two scales at the base, between which springs the foot of the stamens; style none; stigmas two, sessile, somewhat thread-shaped, a little shorter than the germen, spreading. *Peric.* Capsule ovate, eight-freaked, with two cells and two valves; partition parallel to the valves, slightly opening, not fixed. *Seeds* numerous, almost covering each side of the tumid partition, somewhat imbricated downwards, nearly oval.

*Eff. Ch.* Male, Calyx none. Corolla none. Stamens two, on a common stalk.—Female, Calyx none. Corolla none. Germen ovate. Stigmas two, sessile. Capsule of two cells and two valves, many-seeded.

1. *P. Ceratophyllum.* Michaux t. 44. Willd. n. 1.—Native of rocks about the falls of the river Ohio.—*Stem* a finger's length, thread-shaped, floating. *Leaves* pinnate, alternate; leaflets alternate, bristle-shaped, much cloven. *Flowers* axillary, solitary, the males inserted at the base of the females.

We are unable to trace any affinity to this curious genus. It has certainly no relation to *Ruppia* as Michaux has suggested. Mr. Pursh places it in *Monandria Digynia*.

PODRELSKOI, in *Geography*, a town of Russia, in the government of Viatka; 32 miles N.N.E. of Viatka.

PODRUS, a river of Walachia, which runs into the Syl, about three miles E. of Motril.

PODSPUSKNOI, a fort of Russia, in the government of Kolivan; 220 miles S.W. of Kolivan. N. lat.  $51^{\circ} 20'$ . E. long.  $78^{\circ} 34'$ .

PODSTEPNOI, a fort of Russia, in the government of Kolivan; 196 miles S.W. of Kolivan. N. lat.  $52^{\circ} 10'$ . E. long.  $77^{\circ} 40'$ .

PODULLUNG, a town of European Turkey, in Moldavia; 28 miles S.W. of Jassi.

PODURA, the *Spring-tail*, in *Entomology*, a genus of insects of the order Apterata. The generic character is, lip bifid; feelers four, subclavate; two eyes, composed of eight facets; the antennæ are filiform; the body is scaly; tail forked, bent under the body and acting as a spring; it has six legs that are formed for running. There are about thirty species enumerated by Gmelin. They are all small insects, which, in general, are found in damp places, under stones, on the bark of trees, &c. When disturbed they suddenly spring to a small distance by the help of a long fork, which is doubled under the abdomen, and which is suddenly thrown out during the act of leaping. They feed on the leaves of various plants; the larva and pupa are six-footed, nimble, and resemble the perfect insect.

*SIGNATA.* Sub-globular, brown; abdomen with fulvous spots at the sides.

\* *VIRIDIS.* Sub-globular, green, with a yellowish head. Found on the leaves of the Polygonum fagopyrum.

\* *POLYPODA.* Sub-globular, black; antennæ as long as the body, and tipped with white. Found on various plants, in this and other countries of Europe.

\* *ATRA.* Globular, shining brown or black; antennæ long, composed of many articulations. It is found on the bark of trees.

\* *PLUMBÆA.* Round, brown, with a blue gloss. It is found in similar situations with the last.

\* *MINUTA.* Ovate, yellow, with two ferruginous spots on the back. This and the four following are found on plants in many parts of Europe.

\* *NIVALIS.* Oblong, yellow, with two ferruginous spots on the back. It is frequently found in the winter on the snow in the footsteps of men and other animals.

\* *VAGA.* Oblong, black; abdomen and antennæ with a white band.

\* *ARBOREA.* Oblong, black, with white legs and forks.

\* *VILLOSA.* Oblong, villous, variegated with brown and black.

*CINETA.* Cylindrical, grey, with a black belt, which is white on the fore-part. This and the next are found chiefly in woods.

*ANNULATA.* Livid, with black wings.

*LIGNORUM.* Lead-colour, with pale head, thorax, legs, and fork. This is a European insect, very small, and found in old wood.

*PUSILLA.* Cylindrical, bronzed with a white fork. It inhabits woods.

\* *AQUATICA.* Black, aquatic. This is one of the most common species of the genus, measuring scarcely the one-twelfth of an inch in length, and entirely of a black colour. It is a gregarious species, and is occasionally seen assembled in vast numbers, particularly near the brinks of ponds, covering the ground to the distance of several feet, and sometimes even the surface of the water itself. On the ground its numbers are so great, as to have the appearance of scattered grains of gunpowder; and if closely examined, will be found in an almost perpetual skipping motion.

\* *FINETARIA.* White, terrestrial. This perfectly resembles the last except in colour, and in that the specific difference consists. It is found early in the spring in fresh earth, and also in damp places.

*AMBULANS.* White, with a bifid extended tail. Found among moss in different parts of Europe.

*MONURA.* Whitish, with an undivided conic tail. It inhabits Austria, and found with the last, which it resembles, but is much less.

\* *RUFESCENS.* Reddish-yellow, villous; eyes black; fork whitish. A native of Austria, and found among stones.

*VIRIDIS.* Sub-cylindrical, yellow-green, with black eyes. This is found in Norway.

*MOTITANS.* Long, red, with an extended tail; antennæ and legs hyaline. This and the eight that follow inhabit Denmark.

*SYLVATICA.* Cylindrical, grey-brown; tail pointed and unarmed.

*FEMORALIS.* Oblong, cinereous; tip of the antennæ and legs white; tail of a sulphur colour.

*AQUATILIS.* Cylindrical, yellowish, with black eyes, back, and sides of the abdomen.

*CRYSTALLINA.* Body entirely hyaline.

*LONGICORNIS.* Cylindrical, yellowish; antennæ as long as the body, and with legs cinereous.

*PALUSTRIS.* Yellowish, with black eyes and line down the back; the fork is white.

*LANUGINOSA.* Silvery-gilt covered above with blue wool; antennæ recurved.

*CRASSICORNIS.* Dull blue, cylindrical and growing thicker towards the tail.

*HUMICOLA.* Blue-brown; antennæ short, thick; body cylindrical, and growing thicker towards the tail. Inhabits Greenland, as does the next.

*MARITIMA.* Blueish-black, with a whitish abdomen; body nearly round, and growing thicker towards the tail.

*PODIRA* is also a species of *Cercaria*, in the class of *Vermes Infusoria*.

PODURUEVA, in *Geography*, a town of Russia, in the government of Irkutsk, on the Lena; 12 miles N.N.W. of Vercholenk.

POE, a river of the county of Tyrone, Ireland, which rises in the south-western part, and joins the Camern a little below Omagh.—Also, a town of Africa, in Biol; five miles S. of Portudel.

PCEANOPSIA, ΠΟ.ΑΝΩΠΙΣ, in *Antiquity*, a name sometimes given to the festival Pyanepfia.

PÆCILASIUM, in *Ancient Geography*, a town situated on the southern coast of the isle of Crete. Ptolemy.

PÆDICULI, or PÆDICLI, the name of one of the three people who composed the nation of the Iburni. They came originally from Illyria, about the 16th century B.C.; settling at first between the Alps and the Athesis, when they retired towards the south of Italy into Japygia. The Pædiculi, Apuli, and Calabri spoke the same language, which they retained. Strabo.

POEJANNY, in *Geography*, a town of Bengul; seven miles S. of Koonda.

POEL, an island in the Baltic, near the coast of Pomerania, irregular in its figure, and about six or seven miles in circumference, containing several villages; two miles N. of Wismar. N. lat.  $53^{\circ} 57'$ . E. long.  $11^{\circ} 26'$ .

POELEMURG, CORNELIUS, in *Biography*. was born at Utrecht in 1586, where he became the disciple of Abraham Bloemart; but he quitted that master as soon as he had made a reasonable proficiency in the art, and travelled to Rome. His first determination was to imitate the manner of Elstheimer; but he found himself so affected while he contemplated the works of Raphael, that he resolved on endeavouring to emulate the grace of that incomparable master; particularly in the naked.

He formed for himself a style that was entirely new, and in many respects preferable to the Flemish gusto; but it did not resemble the style of any Italian master, except in the ruins of the antique buildings, with which he adorned his landscapes; and which he had with great care copied after nature. He surpassed all his contemporaries in the delicacy of his touch, in the sweetness of his colouring, and in the choice of agreeable objects and situations. His skies are clear, light, and transparent; his back-grounds, ornamented often with the vestiges of magnificent Roman edifices, which always contribute to the harmony of the whole composition; and his female figures, which he generally represented naked, are beautiful and elegant forms. His greatest excellence appeared in the small pictures of his hand, for in the larger size he is not so deserving of commendation.

The Italians were excessively pleased with the works of Poelamburg; and some of the cardinals at Rome, of the finest taste, attended him frequently while he was painting, to observe his manner of working, and expressed their admiration in the strongest terms.

It was not without regret that he left Rome to return to his own country; though he afterwards found sufficient cause to be pleased with the honours he received from the grand duke of Florence, and the respect shewn to him in every city through which he travelled, as well as in his native city Utrecht. For, not long after his arrival, Rubens paid him a friendly visit, and having expressed a singular pleasure in examining the works of Poelamburg, he purchased several for his own cabinet, and bespoke others; by which generous conduct, so similar to that of Apelles towards Protogenes of Rhodes, he instructed the lovers of the art to estimate the merit of Poelamburg as highly as they ought; and at the same time advanced the fortune and the reputation of that artist.

By king Charles I. he was invited to the court of London; where he painted many curious pictures, for which he was nobly recompensed; and that monarch endeavoured

earnestly to induce him to continue in England; but his fondness for his own country prevailed over all other considerations, and he returned to Utrecht, where he acquired an affluent fortune, and lived in universal esteem. Several very eminent artists procured him to paint the figures in their works, particularly Steenwyck and Kierings; and the excellent perspectives of the former are sometimes rendered still more estimable by the pencil of Poelamburg.

The genuine work of this master are exceeding scarce; but his disciple, John Vander Lis, imitated his manner so successfully, that the paintings of Lis are very often taken for the works of his master. Fufeli's Pilkington.

POELSBROECK, in *Geography*, a town of Holland; seven miles S.E. of Gouda.

POEM, ΠΟΕΜΑ, ποίημα, a composition in verse, of a due length and measure.

POEMS, *Carmina*, are of various kinds; some denominated from the persons who first invented, or most used them; as the *Archilolian*, *Sapphic*, &c. Others from their composition, as the *monocolon*, consisting of one kind of verse; *dicobn*, of two; and *tricolon*, of three kinds. Others from their entireness or deficiency; as *brachycatalectic*, which in every verse wants two syllables; *catalectic*, which wants one; *acatalectic*, none; and *hypercatalectic*, which hath a syllable too much, which, if cut off at the beginning of the next verse, the verse is said to be *hypermeter*. (See ACATALECTIC, &c.) Others are denominated from the subject matter; as the *apobaterion*, *epibaterion*, *epinicion*, *epithlamium*, *genethliac*, *propemptic*, *elegiac*, *satiric*, *epicedion*, *epitaph*, *threnos* or *lamentation*, *encomiastic*, *panegyric*, *soteric*, *lyric*, *pastoral*, &c. Others from the manner of narration; as *exegetic*, which relates a thing under the author's own person, *dramatic*, and *epic*. See each on its proper head, EPIC, DRAMA, &c. To these may be added, odes, eclogues, and idylliums.

To this head must also be referred several other poetical compositions of a less serious kind, which the idly-labouring vein of little poets has produced into the world, and which, though frequently admired by persons of a low taste, are justly ranked by Mr. Addison in the class of false wit. Such are the acrostic, enigma, anagram, centochronogram, proteus, echo, &c.

PENITENTES, in the church of Rome, a designation given to heretics, who being admonished by the ecclesiastical judge, have abjured their errors, and given sufficient satisfaction to the bishop or inquisition. Confiscation of goods is a punishment common to all heretics; but if they confess and abjure of their own accord, without being formally prosecuted, this part of their punishment is usually remitted. See INQUISITION.

POEROU, in *Natural History*, a name given at Otaheite in the South-seas to the hibiscus tiliaceus of Linnæus, of the bark of which they make matting, coarse cloth, and ropes and lines from the thickness of an inch to the size of a small packthread. Hawkefworth's Voyages, vol. ii. p. 217.

PÆSTUM, in *Ancient Geography*, called also *Pofidonia*, a city of Italy, on a gulf of the same name, at some distance to the S. of the mouth of Silarus. Obscurity hangs over, not only the origin, but the general history of this city, though it has left such magnificent monuments of its existence. According to the learned Mazzochi, Pæstum was founded by a colony of Dorians, from Dora, a city of Phœnicia. It was first called Pæstan, or Postan, which in the Phœnician language signifies Neptune, to whom it was dedicated. It was afterwards invaded, and its primitive inhabitants expelled by the Sybarites, which event is supposed

posed to have taken place about 500 years B.C. Under its new masters Pæstum assumed the Greek appellation "Posidonia," of the same import as its Phœnician name, became a place of great opulence and magnitude, and is supposed to have extended from the present ruins southward to the hill, on which stands the little town still called, from its ancient destination, "Acropoli." The Lucanians afterwards expelled the Sybarites, and checked the prosperity of Posidonia, which was in its turn deserted, and left to moulder away imperceptibly. Vestiges of it are still visible all over the plain of Spinazzo or Saracino: the original city then recovered its first name, and not long after was taken, and at length colonized by the Romans, U.C. 480. From this period Pæstum is mentioned almost solely by the poets, who, from Virgil to Claudian, seem all to expatiate with delight amidst its gardens, and grace their composition with the bloom, the sweetness, and the fertility of its roses. But unfortunately the flowery retreats, "Victuria rosaria Pæsti," seem to have had few charms in the eyes of the Saracens, and, if possible, still fewer in those of the Normans, who, each in their turn, plundered Pæstum, and at length compelled its few remaining inhabitants to abandon their ancient seat, and take shelter in the mountains. To them "Capaccio Vecchio" and "Novo" are supposed to owe their origin: both these towns are situated on the hills: the latter is the residence of the bishop and chapter of Pæstum.

The edifices which still subsist owe their origin, as it is most reasonably supposed, to the Dorians; and their form seems to indicate that they are the oldest specimens of Grecian architecture now in existence. In fact, the temples of Pæstum, Agrigentum, and Athens, appear to be instances of the commencement, the improvement, and the perfection of the Doric order. The first temple that presents itself to the traveller from Naples is the smallest: it consists of six pillars at each end, and thirteen at each side, counting the angular pillars in both directions. The architrave is entire, as are also considerable remains of the pediments at the W. and E. ends. The "cella" occupied more than one-third of the length, and had a portico of two rows of columns, the shafts and capitals of which, now overgrown with grass and weeds, encumber the pavement, and almost fill the whole area of the temple. The second temple has six columns at each end, and fourteen on each side, including those of the angles: the whole entablature and pediments are entire. The "cella," the interior of which is adorned by a double row of columns, supporting each another row of small pillars, had two entrances, one at each end, with a portico formed of two pillars and two antæ. The whole of the foundation and part of the wall of this "cella" still remain: under it was a vault. The third edifice is the largest: it has nine pillars at the ends, and eighteen on the sides, including, as before, the angular columns. A row of pillars, extending from the middle pillar at one end to the middle pillar at the other, divides it into two equal parts, and is considered as a proof that it was not a temple. Some suppose it to have been a curia, others a basilica, and others a mere market or exchange. In common to all these edifices it may be observed, that they are raised upon substructions, visible in all the Doric temples of Italy and Sicily, forming three gradations, intended solely to give due elevation and relief to the superstructure; that the columns in all rise without bases from the uppermost of these degrees; that these columns are all fluted between four and five diameters in height, and taper as they ascend, about one-fourth; that the capitals are all very flat and prominent; that the inter-

columniation is a little more than one diameter; that the orders and ornaments are in all the same, and the pediment in all very low: in fine, that they are all built of a porous stone, of a light or rather yellow grey, and in many places perforated and worn away. In the open place between the first and second temple were two other large edifices, built of the same sort of stone, and nearly of the same size. All the temples stand in a line, and border a street that ran from gate to gate, and divided the town into two, nearly equal parts. A hollow space scooped out in a semicircular form seems to be the traces of a theatre, which lying in front of the temples gives reason for supposing that other public buildings might have ornamented the same side and made it correspond in grandeur with that opposite; in which case few cities could have surpassed Pæstum in splendid appearance.

The walls of the town remain in all the circumferences, five at least, and in some places twelve feet high; they are formed of solid blocks of stone, with towers at intervals: the archway of one gate only stands entire. This rampart encloses a space of nearly four miles in circuit; and its extent, with the many towers that rose at intervals, and its elevation of more than forty feet, shew it to have been a work of great strength and magnificence.

Within these walls that once encircled a populous and splendid city, now rise one cottage, two farm-houses, a villa, and a church. The remaining space is covered with thick matted grass, overgrown with brambles spreading over the ruins, or buried under yellow undulating corn. A few rose bushes, the remnants of the "biferi rosaria Pæsti," flourish neglected here and there, and still blossom twice a year in May and December, as if to support their ancient fame, and justify the descriptions of the poets. Virgil and Ovid just mention the Pæstan roses: Propertius introduces them as an instance of mortality: Claudian employs them to grace a complimentary comparison: Ausonius alone presents them in all their beauty and sweetness.

"Vidi Pæstano gauderi rosaria cultu  
Exoriente novo rosida Lucifero."

Idyll. xxv.

Amid these objects and scenes, rural and ordinary, rise the three temples, like the mausoleums of the ruined city, dark, silent, and majestic.

Pæstum stands on a fertile plain, bounded on the W. by the Tyrrhene sea; about a mile distant on the S. by five hills, in the midst of which Acropoli sits embosomed; on the N. by the bay of Salerno and its rugged border; while to the E. the country swells into two mountains, which still retain their ancient names "Callimara" and "Cantena," and behind them towers "Mount Alburnus" with its pointed summits. A stream called the "Solofone" flows under the walls, and by spreading its waters over its low borders, and thus producing pools that corrupt in hot weather, continues, as in ancient times (see Strabo, lib. v.) to infect the air, and render Pæstum a dangerous residence in summer.

Mr. Watkins has given accurate and minute delineations and measurements of these celebrated temples; and he, as well as other travellers, supposes, that the pillars of Pæstum were covered with a sort of plaster, or stucco, which, by its long duration, seems to have acquired the hardness and consistency, as it certainly has the appearance, of stone. Near Pæstum there are four mineral springs, to which is ascribed considerable efficacy in different complaints: from these springs flow as many streamlets, that form the "fiume falso" which falls into the Solofone close to the walls

of the city. Beyond the ruins, and separated from them by a little stream, now called "Paitena," rises the hill of the Acropoli, which merits the examination of the naturalist. As the plains that extend for some way on each side of the Silarus are very thinly inhabited, and at the same time covered with woods and thickets, they are become the resort of banditti and outlaws. At the mouth of the Silarus is the site of the temple of Juno Argiva, of high antiquity, and attributed even to Jason. Eulace's Classical Tour through Italy, vol. ii.

POESY, POESIS. See POETRY.

The word is formed from the Greek ποιησις, of ποιηω, *facio, fabricor, fingo, I make, I frame, I invent.*

Hence alchemy, or the art of making gold, we anciently called *poesy, chrystopoesy, &c.*

POET, POETA, an author who composes poems or discourses in verse.

Cicero relates it as a saying of Democritus and Plato, that there could be no good poet *sine afflatu furoris, without a tincture of madness*; and Aristotle calls poets expressly, *maniaci, maniacs, madmen.*

M. Spanheim tells us that the Arab authors are more poetically given than those of any other people; and adds that there are more verses among the Arabians than among all the other nations of the world put together.

The Greek word ποιητης, *poet*, signifies *maker*, from ποιω, *facio, I make*; whence the poets were anciently also called *factifs*. The name they were properly denoted by among the Romans, was *vates*, which signifies also *prophet*.

By a law of the emperor Philip, inserted in the Code, lib. x. tom. lii. poets are expressly excluded from the immunities granted the professors of all other sciences.

Homer, Virgil, Milton, and Tasso, are the chief, almost the only, epic poets. Sophocles, Euripides, Shakspeare, Otway, Corneille, and Racine, are the best tragic poets. Aristophanes, Menander, Plautus, Terence, Fletcher, Johnson, Moliere, &c. the chief comic poets. Horace, Cowley, Malherbe, and Rousseau, excelled as lyric poets. And Juvenal, Perius, Regnier, Boileau, Dryden, and Oldham, as satiric poets.

POET *Laureat*. See LAUREAT.

This title, says Mr. Gibbon, is perpetuated by custom, rather than vanity, in the English court; and he adds, "from Augustus to Louis, the muse has too often been false and venal; but I much doubt whether any age or court can produce a similar establishment of a stipendiary poet, who, in every reign, and at all events, is bound to furnish, twice a year, a measure of praise and verse, such as may be sung in the chapel, and, I believe, in the presence of the sovereign. I speak the more freely, as the best time for abolishing this ridiculous custom, is while the prince is a man of virtue, and the poet a man of genius." Decl. and Fall of the Rom. Emp. vol. xii. 8vo. 1790.

POET, *Provençal*. See PROVENÇAL, and TROUBADOURS.

POET'S *Casta*, or *Poet's Rosemary*, in *Botany*. See OSYRIS.

POETICAL, ποιητικος, something that relates to poetry or poets. In this sense we say, a poetical genius, a poetical phrase, poetical licence, poetical fury, &c.

POETICAL *Epistle*. See EPISTLE, *Poetical*.

POETICAL *Justice*, is chiefly used in respect to the drama, to denote a distribution of rewards and punishments to the several persons, at the catastrophe or close of the piece, answerable to the several characters in which they have appeared. See CHARACTER.

Whatever difficulties and distresses the virtuous and innocent may labour under, and how prosperously soever it

may go with the wicked, in the course of the piece; the poet usually takes care to give each of them their due before he parts with them. But it is controverted whether this piece of justice be indispensable, and whether it may not be allowed to leave virtue oppressed, and vice flourishing.

POETICAL *Language*, is that language or style, which acquires a peculiar elevation and ardour from the sentiments of a mind, supposed to be animated by some interesting object that fires the imagination and engages the passions of the poet; and this language is very different from that mode of expression which is natural to the mind in its calm ordinary state. This language of passion or imagination is formed, *most commonly*, into regular numbers; because, though versification be, in general, the exterior distinction of poetry, yet there are some forms of verse so loose and familiar, as to be hardly distinguishable from prose, such as the verse of Terence's comedies; and there is also a species of prose, so measured in its cadence, and so much raised in its tone, as to approach very near to poetical numbers, such as the Telemachus of Fenelon, and the English translation of Ossian. The origin and first use of poetical language, says Dr. Lowth, are undoubtedly to be traced into the vehement affections of the mind. For what is meant by that singular frenzy of poets, which the Greeks, ascribing to divine inspiration, distinguished by the appellation of *enthusiasm*, but a style and expression directly prompted by nature itself, and exhibiting the true and express image of a mind violently agitated? Hence proceed sudden exclamations, frequent interrogations, apostrophes, even to inanimate objects; for, to those who are violently agitated themselves, the universal nature of things seems under a necessity of being affected with similar emotions. Every impulse of the mind has not only a peculiar style and expression, but a certain tone of voice, and a certain gesture of the body adapted to it. Some, indeed, not satisfied with that expression which language affords, have added to it dancing and song; and as we know there existed in the first ages a very strict connection between these arts and that of poetry, we may possibly be indebted to them for the accurately admeasured verses and feet, to the end that the modulation of the language might accord with the music of the voice, and the motion of the body.

Most languages have their poetical words, which are seldom, if ever, used on other occasions. These words are of great use to the poets, who are thus enabled to raise their style and diction to the poetical character with the greater ease. The French lament the want of such appropriate words in their language; from a defect of which the style of their poetry is not sufficiently distinguished from the common language. It is too reserved, not being allowed any boldness or flights, but such as might pass in prose. To this circumstance is attributed, in a considerable degree, the little success which their authors have met with in epic compositions. Phrases also, as well as words, which might originally have been in common use, are now restricted to poetical compositions. The language of Homer differs materially in the mode of inflexion, the syntax, and even the words, from that which was written and spoken in Greece in the days of Socrates; after an interval of 400 years. Homer, however, must have written in a dialect that was intelligible, though not perhaps in familiar use at the period in which he wrote. Notwithstanding the change that must have taken place, during so long an interval, in the style both of discourse and writing, the Iliad continued to be the standard of heroic poetry, and was considered as affording a specimen of the most perfect poetical language; though Aristotle

Aristotle had doubts about the correct meaning of particular expressions. If Chaucer had ranked so highly as a poet as Homer did, and the English language under Edward III. had been as perfect as the Greek was in the second century after the Trojan war, his style would probably have been the model of poetical language at this day; as Petrarch, his contemporary, sets even now the standard for the best Italian poets. Many words and phrases, used by Ennius, a Latin poet, but not adopted by any prose writer now extant, are to be found in Lucretius and Virgil, and by them transmitted to succeeding poets. These form part of the Roman poetical dialect, which, as the writings of Virgil, where it is found in perfection, testify, was very copious. The style of this charming poet is so different from prose, and so peculiar, that it cannot be analysed on the common principles of Latin grammar; and yet no author can be more perspicuous or more expressive; or knew better, according to the judgment of Quintilian, to improve even Grecism, and old words by which he seems to be attached, into decoration.

The poetical dialect of modern Italy is so different from the profane, that Petrarch or Tasso can scarcely be construed by those who are well acquainted with the common language of that country; and yet it is not probable that Petrarch, whose works furnish a standard of the Italian poetical diction, made any material innovations in his native tongue. The French poetry, in general, is distinguished from prose rather by the rhyme and the measure, than by any old or uncommon phraseology. Nevertheless, the French, on certain subjects, imitate the style of their old poets, particularly of Marot, and may therefore be said to have a poetical dialect, though less extensive than that of the Italian, or even of the English. The English poetical dialect is not characterized by any peculiarities of inflection, nor by any great latitude in the use of foreign idioms. Words and phrases, however, occur in English poetry that are not to be found in prose writings. Several of them will occur to the readers of our poets. The introduction of such words and phrases serves to render the poetical

style more melodious; and when they are known to be ancient, more solemn, and by association more elegant and sublime. The following lines afford a specimen of poetical words, which no one can read without perceiving their effect:

“The breezy call of incense-breathing morn,  
The swallow twittering from the straw-built shed,  
The cock’s shrill clarion, and the echoing horn,  
No more shall rouse them from their lowly bed.”

We may add, that tropes and figures serve very much to improve poetical language. They render it more pleasing, and greatly contribute to its effect. They supply the unavoidable defects of common language; they are also favourable to delicacy of expression; they promote brevity, which, without interfering with perspicuity, is very pleasing; they give strength and energy to language, and make a deep and durable impression on the mind; they are the appropriate language of emotion and passion. See **FIGURE** and **TROPE**, and each figure under its proper name, as *Apostrophe*, *Hyperbole*, and *Prosopopeia*; which see. The sound of words ought also to be regarded in poetical language; as it contributes to harmony of composition, without which no poet can be popular. See **VERSE** and **RHYME**.

**POETICAL Licence.** See **LICENCE**.

**POETICAL Numbers.** See **NUMBERS**.

**POETICAL Rising and Setting.** See **RISE** and **SETTING**. The ancient poets, referring the rising, &c. of the stars to that of the sun, make three kinds of rising and setting, *viz.* cosmical, acronical, and heliacal.

**POETICAL Theology.** See **THEOLOGY**.

**POETICS, POETICE, ποιητικη**, the doctrine of poetry, or the laws and rules of conducting pieces, or compositions of poetry. Aristotle’s *Poetics* is a work very highly valued; and M. Dacier’s comment upon it is one of his best pieces. Horace, Vieta, Vossius, and Scaliger, have likewise published *Poetics* in Latin; the duke of Buckingham in English; and Menardiere, Hedelin, and Despreaux, in French.

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